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THE RAILWAY REVIEW

No. 46 NOVEMBER 14, 1896. XXXV.

COMBUSTION OF COAL BY HOT AIR ADMITTED ABOVE GRATES.—In a discussion before the Liverpool Engineering Society, Mr. F. Gross of Sheffield said: "It is this admission of hot air above the grates which with our suction raft give best results, and in some of our steamers we have carried it to an absolute extreme, i. e., with bituminous coal we practically admit the whole of the air required for combustion on the top of the fire with the result incidental; never sought for but entirely incidental, no smoke whatever is the result of that system of the admission of the air. The only air we admit through the grate is just a small quantity of cold air to keep the grate in a satisfactory condition. The bulk of the air is, of course, always hot. Now, when you put the volume of air practically necessary for combustion of the coal on the top of the fire at a heat of from 200 to 300 deg. you will find that unexpected as it may be, the smoke question solves itself. You can come at any time to our works (John Brown & Co., Sheffield, England) and you will see ten boilers developing 10,000 horse power, but you will not see a single bit of smoke. It is all due to what I have said. We happen to have a very convenient means of heating the air by what would otherwise be waste heat. It is quite a mistake to suppose that all the air must go through the grate. With bituminous coal there is no question that the admission of hot air on the top of the grate through perforated baffle plates is just the means of obtaining the best analysis of chimney gases, a smokeless condition and the greatest oconomy. I would only point out to you that when burning at a rate of 45 lbs. per square foot of grate, the boiler efficiency, by the means I have named, is as high as 75 per cent. Of course, it is still higher at a lower rate of combustion. And, as I have pointed out, results that would have been thought quite incredible three or four years ago are already obtained in that direction, and the Scotch boiler under new conditions will take a good deal of beating.

IRON FOR MALLEABLE CASTINGS IN ENGLAND.—Special iron has to be selected for castings that have to undergo conversion into "malleable cast iron." It must be very hard and Lorne and Cumberland brands, in England, are largely used, with some white or mottled hematite. Gray iron is quite unsuitable. The castings should show a fine brilliant white crystalline structure when broken, and so hard that they cannot be cut or filed. They have to submit to annealing for several days before they can be operated upon. Small castings are packed in cast iron boxes in the annealing furnaces, and completely surrounded with iron ore or metallic oxides. Red hematite ore is mostly preferred. The ore can be used several times, but requires to have the addition of a little fresh unburnt ore every annealing. Small articles should be kept in the annealing oven at a uniform red heat in the iron boxes for six or seven days, but thick castings may require three or four weeks' annealing Extra care is required in the molding of articles for malleable cast iron. The molds must be very clean, for any dirt or slag shows conspicuously when the castings have come through the annealing oven. Malleable cast iron is undoubtedly of great value in such articles as wheels and pinions. Steel is, however, now superseding the use malleable cast iron to a great extent, for it is little, if any, dearer. Sharp internal angles of all kinds in the patterns for steel or malleable castings should be avoided.—[Engineer.

THE NATIONALIZATION OF SWISS RAILWAYS.—The question of the audit of Swiss railway finance which was submitted to a national referendum on October 4, has (according to the London Times) been brought forward with a view to the nationalization of Swiss railways. It will enable the state to establish the value of these lines at the time of their being taken over by the federation. As such a project necessarily effects in some degree the dividends of the railway shareholders, the administration of the projected Simplon railway have deferred appealing to the public for the necessary funds. The date for commencing the Simplon tunnel works has not yet been fixed, but the negotiations for the construction of the new railway are well advanced. The Italian chamber has yet to give its sanction to the contract, and the federal authorities are awaiting a full statement of the financial prospects of the scheme from the Jura Simplon Company. The minimum capital guaranteed by the federation amounts to ten million francs, of which the state contributes four million, as before in the case of the St. Gothard Tunnel, the other six million being contributed by the cantons and important towns of French Switzerland. On this question of railway financial audit, and a second measure hereafter to be submitted to the vote of the people collectively, that of the creation of a state bank, the cantons are greatly divided. The principal German cantons are, generally speaking, in favor of both projects as part of a wide scheme of government centralization, while French Switzerland and some of the smaller cantons are opposed to any measures which may diminish the cantonal autonomy of Switzerland, or limit the right of private enterprise. There is at present a second project for piercing the Alps at the Great St. Bernard and joining the Italian station of Aosta with Martigny. The cost is estimated at nearly 40 million francs, and the length of the top tunnel would be only three kilometres. This line would be of great importance to Turin, but, owing to the steep gradients necessary, could not enter into serious competition with the Simplon route. The latter would effect great economies of time and distance in the transcontinental service, and would carry the Indian mails.

TRAFFIC VIA THE "SOO" CANAL.—Comparative statement of commerce east and west bound through St. Mary's Falls canal, Michigan, for month of October, 1896:

EAST BOUND.

Items.	Designation.	U. S. Canal	Can. Canal	Total.
Copper	Net tons	9,447	3,320	12,767
Grain	Bushels.	3,320,923	1,441,725	4,762,648
Building stone.	Net tons.	755		755
Flour	Barrels	831,330	431,290	1,262,620
Iron ore	Net tons	490,180	157,319	647,499
Iron, pig	Net tons	565	2,200	2,765
Lumber	M. ft. B. M.	93,182	1,229	94,411
Silver ore	Net tons			
Wheat	Bushels.	6,824,075	2,730,753	9,554,828
Unclass'd frt.	Net tons	11,641	3,927	15,568
Passengers	Number	275	357	532

WEST BOUND.

Items.	Designation.	U. S. Canal	Can. Canal	Total.
Coal (hard)	Net tons.	39,197	13,150	52,347
Coal (soft)	Net tons.	193,407	76,290	269,697
Flour	Barrels	150		150
Grain	Bushels.			
Manuf'd iron.	Net tons.	9,819	2,775	12,594
Salt	Barrels	33,718	80	33,798
Unclass'd frt.	Net tons	46,923	5,123	52,046
Passengers	Number.	311	97	408

East bound freight, net tons		1,355,109
West bound freight, net tons		391,418
Total		1,746,527
Total craft—United States	1,425	
Total craft—Canadian	478	
		1,903
Total registered tonnage—United States	1,407,748	
Total registered tonnage—Canadian	382,104	
		1,789,852

LOW MOOR IRON.—At a recent meeting of the Glasgow and West of Scotland Technical College (metallurgical department), Mr. E. Windsor Richards, president of the Institute of Mechanical Engineers, delivered a lecture on "Best Yorkshire Iron, and How It Is Made." Mr. Richards described the process of iron making in the Low Moor iron works, Yorkshire. Low Moor has passed its hundredth year of usefulness, the first blast furnace having been started in 1791, and the first cast of iron being made in August of that year. He briefly sketched the development of the works up to the present time. Four years ago a new furnace was started which was probably the largest coal blast furnace ever constructed. It was 70 ft. high and had a capacity of 10,700 cu. ft. The old furnace produced from 75 to 80 tons of iron in the week. They in England had often marveled at the greater productive power of the furnaces in America. In this connection he mentioned the interesting fact that he had proved that the new Low Moor furnace worked much more satisfactorily when producing 350 tons per week than when it produced only 200 tons. The works at Low Moor owed their existence to the high quality of coal and to the quality of the ironstone found on the estate. Over three tons of ironstone were required to make a ton of pig iron, and this was the most expensive of the materials used. Having described the refinery and the other appliances used in the industry, he said that a prize scheme had been in operation in the works for many years. This created competition amongst the workmen, and tended to produce the best workmanship. The iron produced was soft, ductile and trustworthy, and was admittedly the best in the world. Alluding to foreign competition, he urged the students not to underrate their foreign competitors. They would find that a knowledge of German and French would be greatly to their advantage, and they should also make a deep study of metallurgy. The lecture was illustrated by a number of diagrams, and specimens of iron and coal were shown.

THE HABIT OF OBSERVATION.—Many foremen walk through a shop as if they were blindfolded, never noticing matters that are plainly before them, and when they find defects afterward are very apt to blame the wrong man, because they did not observe the sequence of operations. A young man was boring a small cylinder that had one head cast in—in the front head. He bored it on a horizontal boring mill and ran a boring bar through the stuffing box, which had been previously bored. When it was done it was taken to the bed plate and the piston put in, or rather the erector tried to put it in but could not, because the piston stuck over on one side about three-sixteenths of an inch. After fussing with it for much longer than he should have, he called the foreman over to see what a bad job the cylinder borer had made. The man erecting the engine said the bore was not true with the hole for the rod, because, as he said, he saw the cylinder borer using the piston rod hole as a guide for the boring bar. The cylinder borer said nothing after a glance, but went around to the front where he saw a gland stuck in the stuffing box; he threw this out on the floor, put the piston in the cylinder and went about his business without uttering a word. Investigation revealed that the man who turned the gland had used an arbor which was untrue, so that the gland was eccentric and threw the rod over so that the piston would not enter. This seems a small matter to relate at length, but, says The Engineer, it is one of these things that point our moral and adorn our tale. If the foreman had known his business he would have discovered the eccentric gland before finding fault with the wrong man and saved friction generally. A man who has not sharp eyes and ears and is not blessed by nature with close observation which he has cultivated by practice so that it becomes another sense, will never make a successful engineer; to his lot falls all the breakdowns and alleged accidents which could have been prevented by seeing what was about to happen. Sharp eyes and quick ears have prevented many breakdowns.

A NEW RIVAL OF COAL AS FUEL FOR WARSHIPS.—French papers give particulars of experiments carried on by M. Paul d'Humy, a French naval engineer, having had for their object the converting of petroleum and other oils into a hard, homogeneous mass, suitable for fuel on board warships and other seagoing vessels. The material he produces is not affected by either heat or cold, and is absolutely smokeless and oderless and he believes it will in time completely change the present methods of propulsion of warships. He has been able to turn the highly inflammable oils into hard cakes of any size or shape, and says they can be stored anywhere without the slightest danger. When ignited these cakes burn only on the surface, and give off an intense heat. The substance cannot evaporate or cause an explosion. It requires very little draft to burn brightly, and makes no more than from two to three per cent of ashes. He calculates that one ton of this fuel will equal thirty tons of coal and that the cost will not be more than from five to ten dollars per ton.

CHOOSING A VOCATION.—"The vocations of many men are simply a matter of accident," says "Fred Woodrow." "What their fathers did or their uncles proposed, or what first turned up when in search of employment, literally fixes the fate of many a youth. It is simply the case of heads and tails in the toss of a penny. It is true that in many cases poverty compels the haphazard method, but it is far from being true in all cases. It is also true that the modern type of boy has a fad in his head that perspiring for his daily bread is bad policy, and that eight hours a day in a mill, a foundry, or a machine shop is not a matter of choice but misfortune. He prefers a genteel business with its white hands, its undisturbed necktie, its tanned shoes and its social standing. It is a free pass to certain circles where otherwise if he was but a plain mechanic he would be denied both chair and cake, and possibly a wife with a bank account. All this has to be admitted; social sugar and social flies cannot be argued out of the world; but for all that, there is a large number of level headed and practical lads who are neither dudes nor imbeciles who by the mistake named are as misplaced in their callings as a man would be in the shafts of a cart, and a mule on the driver's seat. It would not be getting outside the law of gravitation, or on the dark side of the moon, if some good horse sense was used in determining the trade or calling of a boy. It would save some repentance and possibly some big mistakes."

THE WAGNER'S NEW RULE—Some travelers over lines in the Vanderbilt system who ride in Wagner sleeping cars, will be highly gratified; while others will be certain to give emphatic utterance to strong protests. in view of a new regulation that will hereafter be rigidly enforced in the sleepers, says the Railway World. It practically forbids a passenger taking into a sleeping car anything but a small satchel. To be technical, it provides that no passenger shall carry any more baggage than will go under the berth without sticking out into the aisle when it is made up at night. Who that has had occasion to occupy a sleeper, especially if they boarded the car late at night, when other travelers had gone to bed, has not been annoyed by the accummulation of bulky baggage in the aisles, and perhaps stumbled over a "young trunk" at the imminent risk of being thrown violently to the floor. As a rule such baggage is carried chiefly by commercial travelers, who find it a necessity in the rapid traveling they sometimes do from one town to another, and cannot spare the time to have a trunk carried to a hotel. Frequently their stay in a place is so brief that they do not even go to a hotel. Hereafter they will be compelled to check their big satchels on the Vanderbilt roads, and other individuals will enjoy a greater degree of comfort. The new rule went into effect last week, and those who want to escape delays and inconvenience will do well to keep it in mind when ready to start on a journey.

PRECAUTIONS AGAINST SPONTANEOUS COMBUSTION.—As a possible preventive against generating spontaneous combustion in the railway car paint shop, the following fixed rules on care of shop could be advisedly carried out by those in charge: Stop using linseed or other vegetable oils, as a mineral product, which is much cheaper, will answer purpose just as well in process of hardwood finishing etc. Stop paint shop employes of the habit of cleaning their hands with linseed oil and waste, as they are apt to carry such oily waste in the pockets of overalls, which, if forgotten, becomes liable to cause a night fire in the shop. Stop the practice of stiffening and darkening up linseed oil made putties in an open barrel of dry lampblack, as such practice is liable to burn down your shop. Stop the dangerous practice of using a shop stove as an oily waste and rubbish receptacle, as such charges are apt to go off spontaneously and burn down the shop through communicating with summertime stuff usually piled around stove. Stop keeping matches in large quantities in a warm paint shop. Under such circumstances the ordinary

Lucifer match in composition luminous in the dark when stored in warm places, which shows that oxidation, and, therefore, a process of heating is going on with a two-to-one liability of spontaneously flaming. Stop putting off cleaning up the shop until the morrow. Clean it to-day. If you do not, on the morrow you may have no shop to clean.—[W. O. Quest on Spontaneous Combustion.

BRITISH AND AMERICAN RAILWAY EARNINGS COMPARED.

The receipt in England of Poor's (1896) Manual has afforded an opportunity for making some comparisons between British and American Railways which are not only interesting but suggestive. Engineering takes occasion to note that, relatively speaking, railway construction in this country was last year lower than in Great Britain; and it finds in such a condition a tendency to end speculative construction of railroads for the benefit of contractors and promotors. Continuing the comparison, it says:

From the shareholder's point of view, it is some satisfaction to observe a cessation of the rapidly accumulating load of bonded debt per mile of railway, while at the same time the stock is not increasing, so that the total liability on capital value per mile is less, particularly on the lines in the interior. The increment of population in the New England and Atlantic states must tend to increase the cost of stations and urban lines, as in this country, so that it is not surprising to find that the capital value in New York and contiguous states is £25,000 per mile, while on the inland and Pacific states it is but £10.000 or £12,000, against £47,280 in Britain. But the substantial nature of our permanent way and the cost of land in large towns may be sufficient explanations. The States railways, however, succeed in earning only 2.94 per cent on their total liabilities; we earn 3.95 per cent. The "watering" of stock may have something to do with this lesser return, but only to a small extent.

Of course the conditions in the two countries are so very different that no very useful deduction can be made from any comparison of the results. Still, a consideration of the returns of the year will be rendered more interesting by some comparative figures being given. In the first place, while the cost of construction of our lines is only about double the average rate in the states, our receipts per mile of railway are more than three times greater—£3,844, against £1,234. This latter figure, by the way, is less than it has been for several years, while the British figure is more than the average for the decade. Even in sparsely populated Ireland the railways bring £1,074 per mile. Something like one-fourth of the receipts is got from the passenger traffic in the states, while in this country nearly one-half (46 per cent) is so received; but this is not at all surprising in view of the heavy freight traffic and the long hauls necessary on the other side. The British railways, again, work more economically, notwithstanding the stringent laws as to hours of labor and the costly provisions for safe working. The low ratio of expenditure to receipts is largely the consequence of a good permanent way, although it may be stated that vast improvements have been made in this respect in America. But 12.2 per cent of the mileage is still laid with iron rails. During the past year the reduction in the iron lines—7,000 miles—was equal almost to the length relaid with the superior metal in the preceding three years. Of the gross receipts 70.37 per cent is absorbed in expenses; 10 years ago the ratio was 68.72 per cent.; this increase is also reflected in the British return—10 years ago it was 52 per cent, now it is 56 per cent. This difference of 14 per cent between the two countries suggests differences in practice. Much of the gross revenue in the states goes in commissions and equivalents. This partly explains the fact that while in this country the net receipts per mile is nearly £1700, in the United States it is only £366.

There has been a decrease in the number of passengers per mile of railway in the states; the total is 3036, which is less than it has been since 1886, the average for the intervening years having been quite 300 more. This may be due in large measure to the great increase in electric street railways in recent years, affording not only rapid but cheaper suburban transit. Again, there has been a slight decrease in the rates in the 10 years—the mean being something like 1d., although in the interior states it is about 1¼d. Our average will be about the same, but we still have a larger amount for each mile traveled by a train—about 4s. against 3s. 4d. in the states. This latter is about the same as in Scotland. In Ireland, owing to the large number of second-class passengers and fewer trains, they manage to get 3s. 8d. per passenger train. In new England they get 4s. 8½d., in old England 4s. 1½d. In the former case each passenger traveled only 16 miles; the average for the states is 23 miles. It is doubtful if in this country the average distance is so high, owing to the very extensive local traffic in the metropolis. It appears as if the number of passengers per train were less in the states, where the average is 38; in the New England states it is 61.

As we have already stated, it is the freight traffic on which the railways most depend, and here it is gratifying to note that the year under review has provided the companies with the largest volume of freight on record—763¾ million tons were handled. But this magnificent figure does not look so large when it is recalled that in our little island, with but one-ninth the railway mileage of the states, we deal with 334 million tons. There is no means of estimating the length of haulage in this country—our companies consistently refusing to give the Board of Trade the ton mileage. This is available in the states, where, in the past year, each ton was conveyed an average of 116 miles at 0.839 cents, or just over ¾d per ton per mile. Each train seems to have taken on an average 180 tons—a moderate load, and thus the receipts per goods train mile were 6s. 3½d., a most satisfactory return especially when compared with the 5s. 9¾d. per mile of the British goods train. It may also be assumed that the long bogie wagons used in mineral and other trains in the states, reduce the ratio of tare to load sufficiently to affect the tractive cost per mile, so that the net difference ought to be greater than the gross receipts, but it is not. We find the average receipts per mile highest in the great grain growing states of the northwest, where they exceed 8s., and here the volume of freight traffic has doubled in 10 years, increasing at the same rate as the mileage; but a reduction in rates has reduced the gross receipts per train mile from 9s. 2d. The return per train mile is really lowest in the Atlantic states, but there it is still 6s. 1d. In England it is 5s. 10d.; in Scotland, 5s. 8d.; and in Ireland, 6s. 1½d.

From the shareholder's point of view, therefore, the cessation in railway construction in the states is satisfactory and be it remembered a large volume of the shares and bonds are retained in this country, more for speculation, perhaps, than investments, although we are willing to believe that many of the good lines find favor with the investor here. The only serious objection is the heavy proportion of receipts absorbed in expenses. This is not only higher than in this country, but exceeds the ratio in most of the Australian colonies and in India, where the conditions are as adverse to high dividend earning as in the states. Clearly there is a leakage; but the returns are in this respect far less conclusive than the admirable report by Sir Richard Giffen and Mr. Hopwood on the British railways. No attempt is made in Poor's Manual to analyze any expenditure. By dividing the receipts by the number of locomotives—37,090—we find that each is equal to earning £5,800, while the British locomotive has a gross revenue of £4,500. only; but we have a very much larger stock for the length of our railways—that is necessary for the great volume of traffic to be dealt with. Thus the United States has only one locomotive for each 4.8 miles of line, we have one locomotive for each 1.13 miles.

As we have already indicated, the return to capital in the states is only 2.94 per cent, against 3.95 per cent in this country. The bonded debt, however, required about 4¼ per cent, and thus the dividend on share capital did not exceed an average of 1.59 per cent, against 2.75 per cent in 1883. In this country the ordinary shares last year got an average of 3.80 per cent. In the states it varies much with the different districts. In New England largely populated, with a good traffic, and heavy working expenses—73.56 per cent—the return to ordinary capital is 4.87 per cent. In the middle states—New York, etc.—excessive competition has reduced freight rates to ¾d., against 1¼d. per ton mile in the New England states, so that although the volume of traffic is as great, and the ratio of expenses to receipts lower, the return to ordinary capital is but 2.46 per cent. In the central northern states there is a less volume of traffic, with the same ruinous competition, so that the return is 2.14 per cent. The south Atlantic states have only one-fourth of the traffic retained by the New York group, with heavier expenses and the same low rates, so that their return to capital has almost reached vanishing point. It has never been much over 1 per cent but has steadily dwindled to .38 per cent, and even the bonds must in many cases be "passed," 3.67 per cent only is paid. The far western states are nearly as bad from the same causes, for although they earn about £800 per mile of railway open, their expenses are very high. The grain growing states are rather better than the others, getting ½d. to ¾d. per ton mile; but the return is only 1 per cent on the ordinary shares, while in the Pacific states it is 0.03 per cent. In nearly all cases there has been a slight decrease as compared with last year, although there are indications that the long suffering bondholder has perhaps come out fractionally better. It is to be hoped that the excessive competition may in some slight measure be lessened by the temporary cessation in railway building, for after all it is only legitimate railway mileage and judicious competition that can help trade.

Engineer's Club of St. Louis.

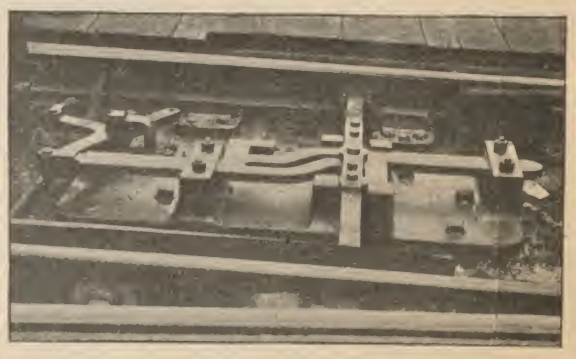
At the regular November meeting of the Engineer's Club of St. Louis, Mr. M. L. Holman presented, informally, the proposed specifications and form of contract prepared by the board of public improvements for the lighting of the streets, alleys and public places of the city of St. Louis for a term of twenty years beginning in 1900. The most important features of the proposed contract were the exclusive use of 32 candle power incandescent lights in place of the arcs of 2000 nominal c. p., all the wires to be underground.

St. Louis was one of the first large cities to adopt electric lighting on a large scale and has therefore had a very wide and valuable experience, arcs being used for the streets generally and incandescents for the alleys, parks, and also for a number of suburban streets. Valuable practical experience had therefore been had in the use of both kinds of lights, and the adoption of the incandescent light to the exclusion of the arc is the result of a careful investigation into the illumination given by the two systems.

Discussion followed by Messrs. R. E. McMath and B. H. Colby, who with Mr. Holman formed the sub-committee of the board which had this work in hand. They emphasized the fact that their conclusion was based upon actual observations made on the two systems of lighting in regular service in this city. The arc lights give a very unequal distribution, the illuminations being very intense at one point, and there being but little light midway between. The incandescent lights, on the other hand, are placed much nearer together and afford a much more uniform light.

AN ENGLISH SWITCH AND LOCK MOVEMENT.

In the discussion of the paper by Mr. W. H. Elliott upon the subject of the switch and lock movement before the Railway Signaling Club, which was published in abstract in the RAILWAY REVIEW of October 31, Mr. H. M. Sperry stated that this device was used upon only one railway in England, the Midland, and we are enabled to show the form of movement in use on that road in the accompanying illustration which was recently made from a photograph taken of the apparatus as fitted to a switch. The method of attaching the switch and lock movement to the switch is very different from our practice. On the Midland the movement is placed between the switch points, which would not be possible with our usual practice of using a number of rods to keep the points properly spaced. The illustration shows a large base



ENGLISH SWITCH AND LOCK MOVEMENT.

casting with lugs cast upon its upper face which are machined to form bearings for the sliding bar. This bar is in one piece of forged steel and is so formed that the locking pins are incorporated in the bar itself instead of being made in the shape of loose pieces which are bolted on in putting the movement together.

The construction is simple and a large number of parts are avoided by placing the movement between the rails. It will be seen that the slide bar is double at its central portion forming a cam which operates a large roller upon the front rod of the switch. The front rod is arranged to receive the locking bolts between two pins which are passed vertically down through the two parts of the rod. The bolt in the front of the picture is in its locked position while the other one is in such a position that its form may be seen. These bolts are cut off squarely at the ends and they are of rectangular section which renders close adjustment of the switch an absolute necessity or else the bolts will not enter. From the engraving the impression of strong construction and ample wearing surfaces is given and the method of attaching the device has much to recommend it. It is obvious that to apply a detector bar upon the outside of the rail an extra crank would be required, but the movement itself is exceedingly simple especially as to the number of pieces which go to make up the whole movement.

The Atchison Topeka & Santa Fe Coal Properties.

The Atchison, Topeka & Santa Fe Railway's latest annual report, just issued, refers specifically to the coal properties of that company. The railroad company has very properly (as we think) practically gone out of the coal business. It has leased its Colorado coal mines to the Colorado Fuel & Iron Co. for three years, from August 20, 1896. It has also leased its Kansas mines for three years, from October 1, 1896, to Mr. C. J. Devlin, who for several years was manager of the Atchison coal properties.

In the two districts referred to, coal mining, for some time, has been subject to excessive competition. The working of coal mines by railroad companies creates friction in various ways, frequently resulting in loss of general traffic. Heretofore the operating department of the railroad has been charged prices for railroad coal by the mining department sufficiently high to cover all mining expenses thereon; with a liberal margin additional. Commercial sales were also made, but the railroad company has been the largest customer of the railroad mines. Profits thus accumulated were paid back to the railroad in the form of coal company's dividends. During the receivership the price allowed for railroad coal was reduced to a basis which it was thought would leave a reasonable working margin, the result being that the coal company's dividends were diminished, and in

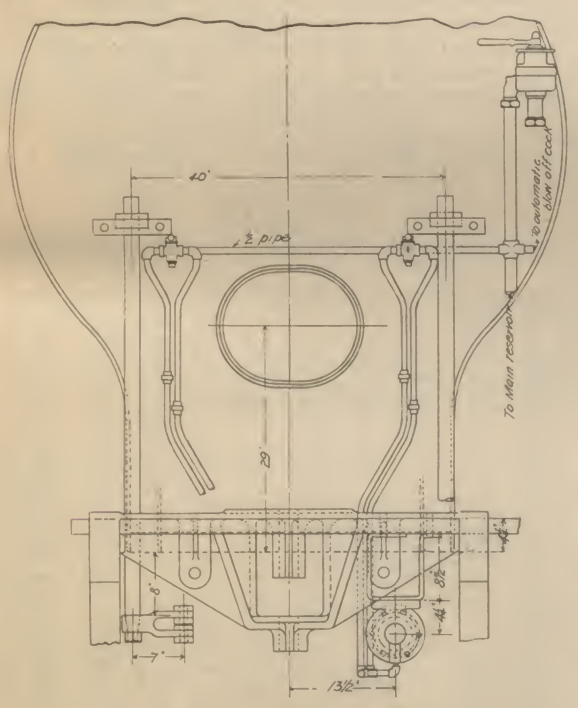
some cases disappeared, by reason of losses on competitive commerical sales. Some very serious mining accidents have occurred; business losses were also experienced. It is exceedingly doubtful whether any profit can be made by the operation of the Kansas and Colorado mines under railroad management, in the face of such competitive conditions as have existed since 1893, assuming that the railroad pays no more for its locomotive coal than the same can be procured for at independent mines. In view of the foregoing conditions the policy of making some other arrangement seemed to be clearly indicated. In both of the leases which have been made minimum royalties and rentals are guaranteed, and the supply of railroad coal is assured at prices lower than has ever been charged to the railroad by its own mines. The terms of the leases are such that the company can lose nothing on the operation of the mines, while the general result of the leases upon the company's net earnings is expected to be favorable in many ways. The Colorado mines leased are those of the Trinidad Coal & Coking Co., the Canon City Coal Co. and the Vulcan Fuel Co. The Kansas mines leased are the Cherokee & Pittsburg and the Osage, the latter including the Scandinavian, recently merged into the Osage Carbon Company.

In New Mexico, the Cerrillos and the Blossburg (Raton Coal & Coke Co.) mines are still operated by the corporations owning same. The company has never operated coal mines in Illinois or Missouri, its coal supply being purchased from mines along the right of way and loaded directly upon engines and cars.

A syndicate has been formed for piercing a tunnel through the grand St. Bernard and constructing a railway of ordinary gage from thence to Turin. This line would put Italy in direct communication, via Lausanne and Bale, with the North of Europe and the ports of the North and Baltic Seas. The Chamber of Commerce at Turin has reported favorably to the Italian government of the scheme.

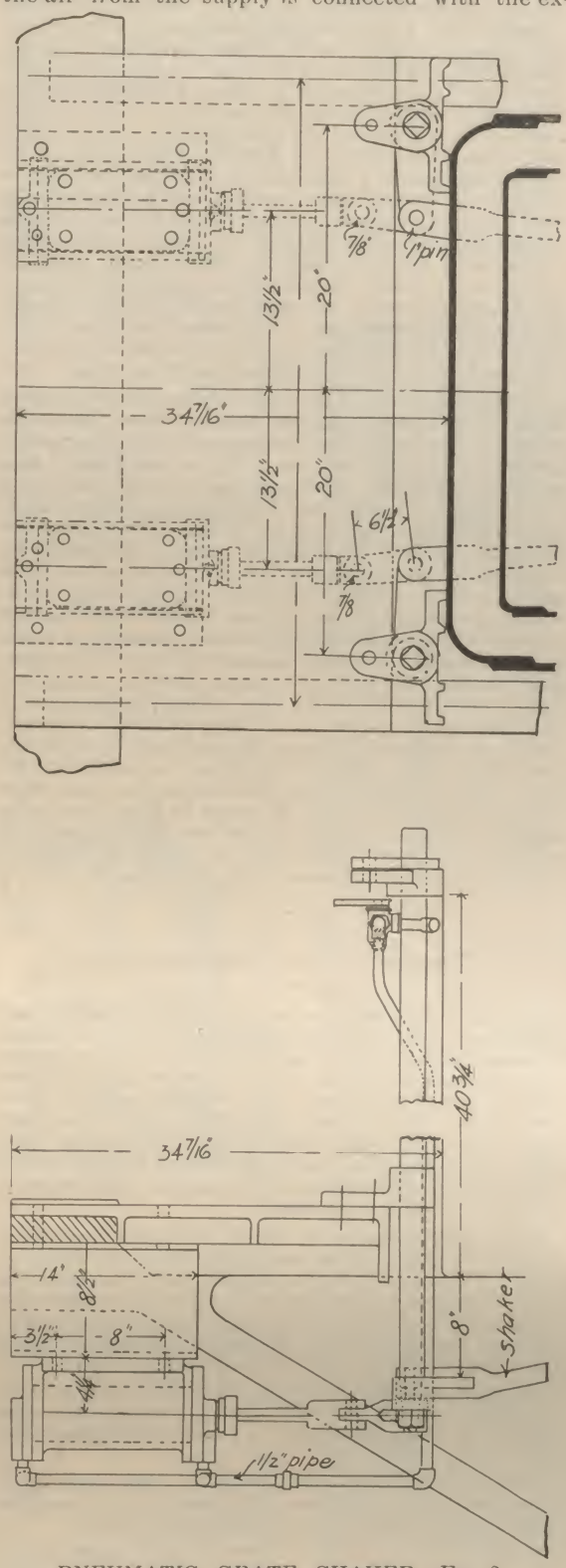
PNEUMATIC GRATE SHAKING DEVICE. C., R. I. & P. RAILWAY.

Among the novel applications of compressed air upon locomotives which has just been brought into notice, is the pneumatic grate shaking attachment designed by Mr. George F. Wilson, superintendent motive power and equipment of the Chicago, Rock Island & Pacific Railway, for the new eight wheel passenger locomotives which were recently designed by him and put in service upon that road. This device has been in use for about three months and the experience with it has been entirely satisfactory.



PNEUMATIC GRATE SHAKER.—FIG. 1.

The arrangement consists of two 4½x10 inch air cylinders which are secured upon bracket plates bolted to the under side of the deck plate of the engine, and the piston rods connect with the regular hand attachment for shaking the grates by means of arms welded on to the bottom of the upright shaft which is ordinarly used for this purpose. The accompanying illustrations show three views of the attachment in which the manner of connecting the cylinders to the shaker rods is clearly brought out. The air supply is taken from the main reservoir connection by means of a half inch pipe which extends horizontally across the back head of the boiler immediately above the fire door, and brings the reservoir pressure to two four-way plug cocks. These cocks admit air to one or the other of two pipes which lead to the opposite ends of their respective cylinders, and the end opposite to that which is taking the air from the supply is connected with the exhaust. It is obvious that a slight movement of one of these cocks is sufficient to operate the shaker and the laborious method of shaking it by hand is obviated. The ordinary hand attachment is preserved and in case of necessity it may be used.



PNEUMATIC GRATE SHAKER.—FIG. 2.

STEAM PLANTS FOR ELECTRIC RAILWAYS.

A paper was presented by Mr. Richard McCulloch before the American Street Railway Association at its recent St. Louis meeting entitled "The Modern Power House," from which the following extracts are taken as being of especial interest in connection with electric plants and in which excellent points are made which are of general application in steam engine practice:

Beginning with steam generating apparatus we start with the choice of fuel. This is largely a matter of location. In a general way the proper fuel to use is that which will evaporate the greatest quantity of water per dollar's worth of fuel. It does not pay to burn too poor a quality of fuel, however, because slack containing a great quantity of ash and sulphur will cake and clinker on the grate bars, make a great deal of work for the firemen, refuse to be forced when necessary, and make much ash to be removed. On the other hand, it will not do to make all arrangements for using a very expensive fuel, as a very little wasted in times when the furnaces must be rushed will make a great difference in the cost of operation. As an expensive fuel usually means one which is brought from a great distance, any furnace prepared for burning this would operate under unfavorable conditions if the supply is cut short by strikes or railroad blockades. Where the conditions are favorable for the use of oil, it makes an ideal fuel, requiring no handling, making no smoke or ashes, and allowing the fire to be regulated with the utmost nicety. Buckwheat anthracite coal is used largely by power houses in the eastern cities. It is of high calorific value, clean, making no smoke and little ash, and is capable of being readily handled in coal conveyors and mechanical stokers. In the western cities soft bituminous coal is used by force of necessity. This brings with it the troubles of ash, clinker and dirt, and in the city renders necessary some form of smoke consumer. As has been stated, it usually happens that the choice of fuel is a matter of location, but in cities where several competing grades come to market, it would probably pay to have expert tests made to determine what grade of coal or what mixture is most economical for the work.

In the east, the use of mechanical stokers has grown to such an extent that no large power house is considered complete without them. In most of the western cities, however, and especially here in St. Louis, the mechanical stoker has not been a success. This difference in results may be attributed to the difference in the fuels used. The buckwheat coal of Brooklyn and Philadelphia feeds evenly on the stoker and causes no trouble by cementing the grate bars together by clinkers. With the soft, fragile, bituminous coal, however, clinkers soon form on the grate bars, and very often the fire must be almost completely destroyed to remove them. No mechanical stoker will bear crowding to any great extent and any power house using them must be supplied with a greater capacity of boilers than one where hand firing is the practice. By reason of the fact that the coal is introduced gradually into the hottest part of the fire and the volatile matter slowly driven off, the mechanical stoker is a partial smoke consumer. With the exception of this, there is no advantage in the use of mechanical stokers, except the labor saved, as the great efficiency which was formerly claimed for them has never been proved in actual practice.

Notwithstanding the great number of types of boilers on the market, they may be divided into two general classes, fire tube and water tube. In most of the more recent power houses, some form of water tube boiler has been adopted, as this type possesses some marked advantages over the fire tube boilers. They are non-explosive they may be operated at a higher pressure and consequently are more suitable for use with compound engines; they have a large heating surface and are quick to respond to calls for power; they occupy less floor space and are usually more intelligently designed than the other class. On the other hand; their first cost is greater, there is a greater number of joints to be looked after, and the cleaning is more difficult, especially in those forms which use a curved tube. It has usually been considered that the efficiency of water tube boilers was much higher than the fire tube, but now there is a form of fire tube boiler being made consisting of a shell of large diameter and extra length, containing a large number of flues, which approaches the water tube boilers very closely in efficiency. The high efficiencies obtained in boiler tests are seldom reached in actual practice as they usually result not so much from excellence of design in the boiler itself as from careful and intelligent firing during the test.

It is hardly necessary in presenting a paper before this intelligent body to discuss the reasons why water should be fed into the boilers as hot as possible. Besides preventing the straining of the boiler shell from the sudden changes in temperature, there is a large quantity of fuel saved, and the percentage of this saving will be found tabulated in nearly every work on thermodynamics. The usual methods employed in heating the feed water are, first by the heat of the exhaust steam, and second by the heat of the escaping flue gases. There are numerous patented devices for utilizing the heat of exhaust steam, either by passing the exhaust through a number of pipes surrounded by the feed water, or by spraying the feed water across an opening through which the exhaust steam is admitted. Most of these devices are very simple in their construction, and their efficiency depends very largely on the length of time the feed water and the exhaust steam are in contact, and in case they are in separate chambers upon the conductivity of the separating medium. Care should be taken that the opening for the exhaust steam is never contracted, so that any possible back pressure on the engine is avoided.

The method of heating feed water by the heat of the escaping flue gases has been applied in apparatus under the general name of economizers. The arrangement usually employed is a coil of pipe containing the feed water placed in the flue. In order to keep the soot from settling on the pipes, most forms of economizers are supplied with a mechanism for scraping off the pipes whenever necessary. Sometimes the economizer consists of one large bank of pipes placed in the main flue, and sometimes the apparatus is divided into a number of banks, each placed in a flue leading to one furnace. The choice of arrangements depends largely upon the size of the plant and the general location of the boilers. By means of a properly designed economizer, feed water may be heated to a very high temperature, even above the atmospheric boiling point of water. In the use of any device in which feed water is heated by the flue gases care should be taken that the escaping gases will still retain sufficient heat for the maintenance of the necessary draft after part of their

heat is taken from them by the feed water. In the case of power-houses using natural draft, economizers should not be used, where the draft is not already sufficiently strong, or is just barely strong enough for the work to be done. There are in operation, however, many plants using natural draft, discharging flue gases at a very high temperature, much higher than is necessary to maintain the required draft. Economizers used in such cases would result in a marked gain in economy.

Whatever system of heating feed water is used, the apparatus should be made abundantly large for the work to be done: first, that the water should pass through slowly and receive the full benefit of its contact with heated gas or steam; second, that a large store of water may be kept on hand which is of great service in case of a sudden demand on the boilers; and third, that the feed water heating apparatus may act as a water purifier.. It has been found that the water kept for some time at a high temperature will deposit a great portion of the carbonates and sulphates of lime and magnesia which it has in solution. This is probably due to the expulsion by the heat of the carbonic acid gas contained in the water, thus freeing from solution the lime and magnesia which it is well known are slightly soluable in water containing carbonic acid gas.

With condensing plants, the waste from the condensers is never at a greater temperature than 100 deg. Fahr. and if hot feed water is desired the use of an economizer becomes almost a matter of necessity, as the water from the pumps and the other non-condensing machinery would not have sufficient effect in heating the feed water of a large plant.

Several of the large power houses built during the last few years have abandoned the use of stacks for producing draft, and are operated by means of an induced draft produced by fans placed in the flue or short stack. In this case, the stack is just high enough to clear the roof. This system has many advantages. First, there are no stacks to blow down or fall down, and this point is of special importance in a region subject to tornadoes. The second and most important advantage, however, is the absolute control which it affords in governing the fires, and this point will appeal especially to those power houses subject to sudden and rapidly changing loads. As an illustration of this may be cited the power house recently erected to operate the Baltimore tunnel road. A great part of the time there is no load on the power house, as it is only operated when there is a freight train to be hauled through the tunnel. The manner in which the load is handled is as follows: The boiler room is supplied with blowers in place of stacks, and a slow fire is kept constantly under each boiler. When a telegram is received that a freight train is approaching the blower is started, and on the arrival of the train steam has been raised in sufficient quantity to supply the great demand put upon the boilers. This illustrates the extreme flexibility of the system and it would be difficult to handle this load in any other manner. Economizers are operated with great efficiency in connection with an induced draft, as this system permits the flue gases to be robbed almost entirely of their heat, since it is not necessary to have a large quantity of heat in the flue gases in order to create a proper draft.

Passing from the steam generating system to the engines, we find as a connecting link, the system of piping. In regard to the general plan of the piping, opinion is very much divided. Some favor a single header with leaders to the engines. Others claim that a complete duplicate system is necessary; so that a failure in any part of the system need not cause a serious stoppage. The objection to a duplicate system is the greatly increased cost. In the installation of a duplicate system it is only natural that the material and workmanship employed will be cheaper than if a single system were employed, because it is reasoned that if one side breaks down there is always the other to be depended upon. The other side, however, is often never used until a case of necessity arises, and on account of this very lack of use the valves and joints are apt to be found leaky and in bad condition when suddenly put in operation. A compromise system has been used in some cases in which all pipes are duplicated, each side, however, having only one-half the capacity required, necessitating the use of both sides at all times. In case of an accident to one side the other half of the system may be used by increasing the steam pressure. The best plan, however, seems to be to use a single header divided at convenient intervals by valves according to the size of the plant and the number of units employed, and in laying out the system to use only the best valves, material and workmanship. The power houses having the least amount of trouble with their piping are those having a simple system, probably because it is natural to erect better and take better care of something which is in constant use than something which may easily be dispensed with. All steam and hot water pipes should be covered so as to prevent as much as possible loss of heat by radiation and consequent condensation of the steam. And in this connection it should be noted that there is a great difference in efficiency in the different kinds of pipe covering. Tests have shown that the magnesia plastic and sectional coverings and the asbestos fire felt covering give the best results (Journal of the Association of Engineering Societies, January, 1895). A water separator should be placed in the leader to each engine. It should be large in size and placed as close as possible to the engine. A number of patented separators are on the market, but very good results may be obtained by the use of a simple large tank, with the steam entering at the side and leaving at the top, and supplied at the bottom with a connection to a steam trap to catch any water collecting in the separator.

The question of the selection of the proper engine to operate the plant is so dependent upon what dynamo is to be used that it will be best to abandon our arbitrary classification temporarily and take up first the question of the dynamo. During the past four years the street railroad generator has undergone a radical change. In the spring of 1893 there were installed in this city in the power house of the Cass Avenue & Fair Grounds Railway Company, then being built, the first large direct driven generators of the type which has since become so common. Soon after this the Intramural power house at the world's fair was put in operation, containing one generator of the same size as those in St. Louis and another of twice the capacity. Since that time there have been few large power houses built in which direct driven generators have not been installed, and some of the large systems have found that economy of operation required a change from the belt, countershaft and unit of small size to the large direct driven generator. At the present time, the West End Railway Company, of Boston, which may be considered the pioneer in this country in electric traction, is changing its central power station, which had originally been equipped with a very complete and elaborate system of belting and counter shafting, to a direct coupled plan.

The choice between horizontal and upright engines is chiefly one of space. The horizontal engine is the cheaper, the simpler, the easier to inspect and the easier to repair Outside of the advantage of requiring less space the upright engine has the advantage of less wear on the cylinder, and a more direct strain upon the foundations.

The usual practice in the most modern power houses is to install compound engines. Most of these plants are so favorably situated that condensers may be operated in connection with the engines. This is undoubtedly good practice; but in case condensers are not used, the cost of fuel must be very high for the gain in compounding to pay for the extra investment. Where power houses are favorably situated on bodies of water, condensing becomes a very simple problem, but in case the power house cannot be built on a body of water, as in this city, for instance, in order to use condensing engines, some sort of arrangement must be designed to cool a quantity of water so that it may be used over and over again for the purpose of condensing the exhaust steam. Devices of this kind have long been in use in the city of San Francisco and in Cuba, and lately several of the large manufacturing companies have put on the market complete apparatus for the purpose of cooling water after it has condensed the exhaust steam so that it may be used again for the same purpose. Besides the gain in power by using condensing engines it is claimed that by the use of this apparatus actually less water is used than if steam is exhausted directly into the atmosphere without condensing.

The Corrosion of Gage Glasses.

A contributor writing to Engineering remarks that every one who has had anything to do with steam boilers in actual practice must have noticed how quickly gage glasses waste away at the end which enters the top fitting and is surrounded by steam. The wasting seems to affect some kinds of glass more than others, and is probably more rapid with some waters than with others. It is quite likely also that boiler fluids have something to do with the speed at which the waste goes on. High pressure steam also seems to encourage it.

Being rather curious to know how much waste there would be on gage glasses suspended inside the boiler, he says: "I recently took six glasses, had them carefully weighed and hung by wires inside a Cornish multitubular boiler working at from 80 lbs. to 90 lbs. per square inch. Three of the glasses were suspended in the steam, three in the water between the shell plate and the tubes.

"Four of the glasses were plain and two enameled with a white bar about ⅜ in. wide. Two of the plain ones were boiled for a considerable time in tallow before they were placed in the boiler.

"These glasses remained in the boiler for six weeks while it was at work, and were then removed and carefully weighed, the result being given in the table below:

No.	Description.	Weight before being put in Boiler.	Weight when taken out of Boiler.	Where Placed in Boiler	Loss in Weight per Cent.
		grains	grains		
1	Plain glass	1·86	1057	In water	2.7
2	Plain glass	1049	1047	In steam	0.2
3	Plain glass boiled in tallow	873	825	In water	5.5
4	Plain glass boiled in tallow	1124	1124	In steam	0.0
5	Enamelled glass	1040	980	In steam	5.8
6	Enamelled glass	1073	1035	In water	3.34

"Glasses Nos. 2 and 4 were quite smooth when taken from the boiler, and it will be seen that one of them was quite unaffected by the treatment it had undergone, and the other was almost unaffected. Both were in the steam space; one had been boiled in tallow and the other not.

"All the other glasses were more or less pitted and eaten away, and with the exception of No. 5 those in the water had suffered more than those in the steam. This seems rather curious, because when in use on the boiler the glasses always waste at the end which is surrounded by steam.

"From the above table the plain glasses seem to have suffered less than the enameled, and as far as my experience goes this is so in actual practice. I may state that the water used in the boiler was supplied by the New River Water Co., and a disincrustant was used."

MODERN IRON WORKING APPLIANCES.

II.

FOUNDRY EQUIPMENT—WHEEL CASTING AND LIGHT CRANES.

The wheel foundry is naturally important to railways, but the art of wheel making has reached the stage at which most railways find it cheaper and more convenient to buy wheels than to manufacture them. The manufacturers all give a guarantee as to service and take scrap wheels in exchange for new ones, and as the prices have been cut down to an almost ruinously low figure, and the railways are relieved from the foundry loss, which can easily run up to a high percentage, it would seem that the railways are pursuing a wise course so long as the manufacturers do not cut the prices so low as to make it impossible to furnish good wheels, and at the present time they seem to be on somewhat shaky ground in this respect.

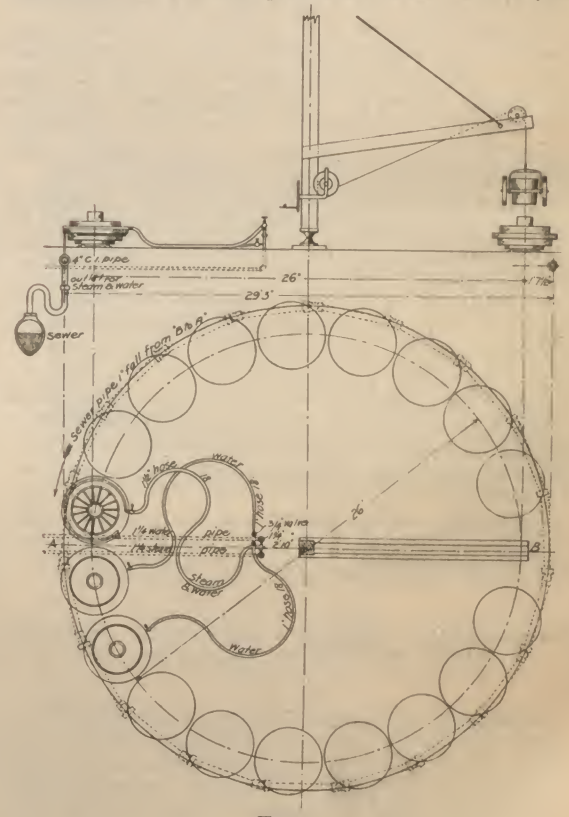


FIG. 7.

In laying out wheel foundry floors, one of two systems is used as shown in Figs. 7 and 8. In the system shown in Fig. 7 the chills are arranged in a circle and are served by a jib crane in the center. The system as shown here is designed for the use of the contracting chill, and therefore the steam and water pipes used with that form of chill are shown. The chills, flasks, ladles and wheels are handled by the

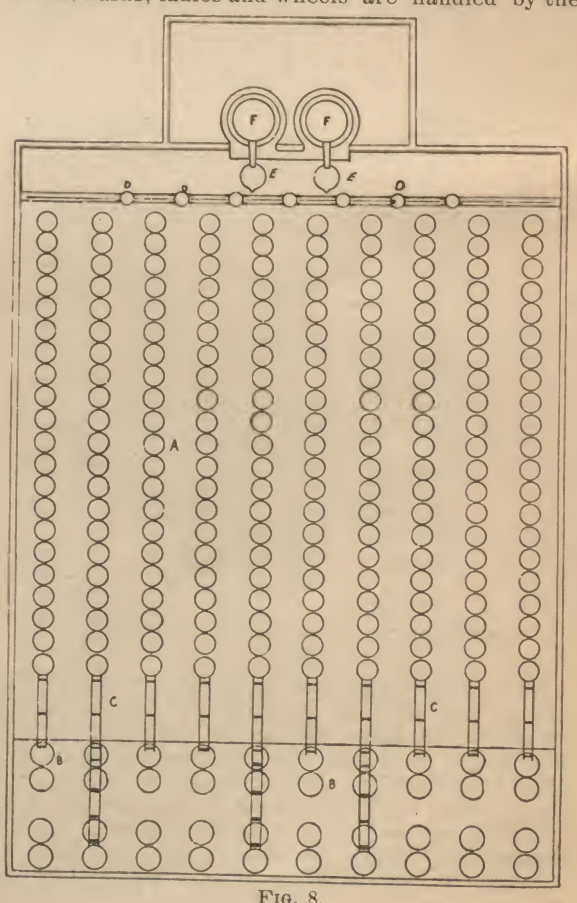


FIG. 8.

crane when on the floor, but they must all be carried to and from the floor on cars or trucks. This system necessitates a large area of unoccupied space and therefore requires a larger building than the system shown in Fig. 8 for turning out an equal number of wheels. With the latter system the chills are arranged in rows and are handled by a carrier system, which is illustrated in Figs. 9 and 10. The carrier is rope driven and consists essentially of a carriage, N, Fig. 10, which travels on a track, P, the latter being located directly above the row of chills which it is intended to serve. The movements of the carriage and also the lowering and hoisting of the block are controlled by means of a wire rope which extends over the whole length of the foundry at the line of chills. When pouring, the ladles are carried on a series of small cars, D, Fig. 8, which are connected by wire ropes and after being filled are by a movement of a lever, G, Fig. 9, moved along the end of the floor until opposite the line of chills, where they are wanted. When in this location they may be reached by the carrier, hoisted, carried to the proper chill and there, by attaching handles, may be poured. The annealing pits, B, are arranged across the end of the foundry, and the wheels are carried to them from the floors by means of the same carriers.

This is known as the Whiting system and over 150 of the travelers described have been put in by the Whiting Foundry Equipment Company and are handling an average daily output of over 3,000 car wheels. It will be noted that all lifting and moving of flasks, ladles and wheels is done entirely by power and this has made it possible to reduce the foundry force to one molder and one helper to each floor of twenty wheels and these with one man to tend the cupola, one man to attend to the pitting of the wheels and the removal of the cold ones, one boy to handle the pitting cranes, make a total of two men and two boys as the entire foundry force in addition to the molders and their helpers. Besides the small

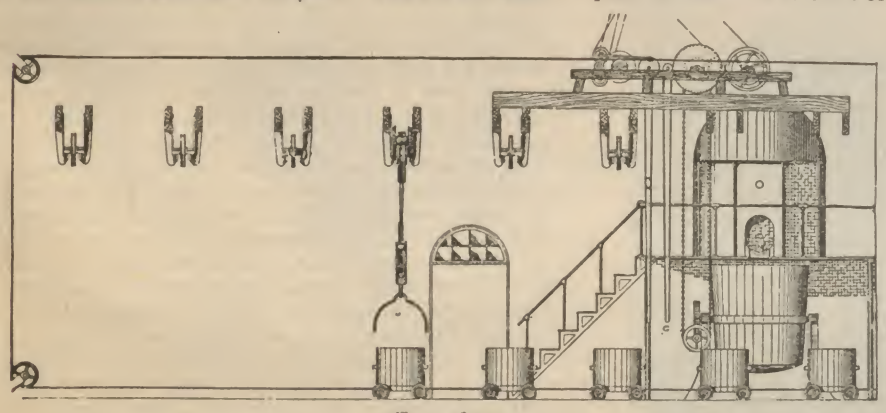


FIG. 9.

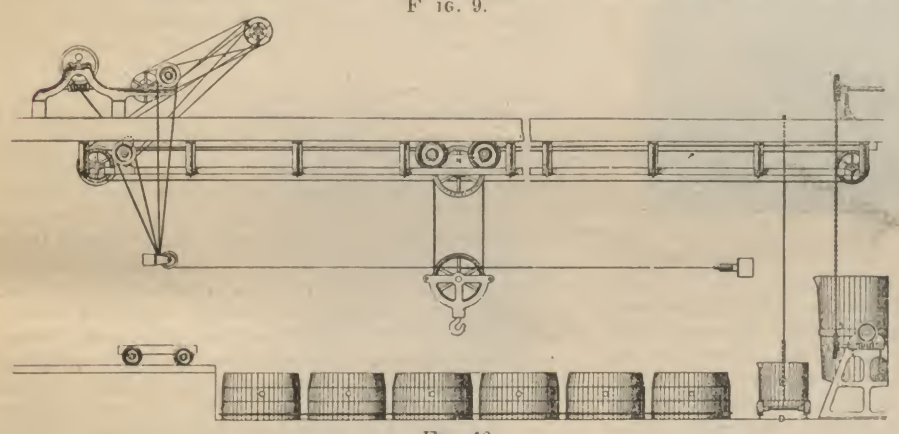


FIG. 10.

number of men required for operating the system it has the advantage of occupying a very small amount of floor space in proportion to the output. This is a very important item where ground is high priced and where it is desirable to invest only a small sum in buildings. The amount of space required for a plant having a daily capacity of 210 wheels is about 10,800 square feet on this system while with a jib crane system such as that shown in Fig. 7, 16,280 square feet would be required for a plant capable of turning out 200 wheels per day. The jib crane system, however, has one great advantage over the other as it is usually installed, resulting in an arrangement of a foundry which is much lighter and free from dirt, smoke and gases, but there is no reason why a foundry having the traveler system should not be satisfactory in this regard if the necessary floor space be given it.

In foundry cranes the variety of styles and designs is legion. No modern foundry where heavy work is handled is now considered complete without an electric traveling crane, but as this type of crane is also used about machine shops it will be described in connection with that department and at this time only a few types of hand power cranes will be given as shown in Fig. 8.

In the illustration Fig. 11 the crane marked No. 150 shows the most common type of variable radius, single braced, steel frame crane having hoisting and racking gearing. This is probably the cheapest form of crane in use and is one which may be adapted to nearly all localities and classes of work. No. 129 shows the same type of crane in the pillar form which is supported entirely from beneath and is adapted for use in buildings where it is not convenient to support the top of the crane and it is used also for out door work. The support consists of a heavy iron pillar firmly secured by a substantial foundation which extends up inside the mast. No. 170 and 180 show a light and heavy design of a triple braced crane which is used in locations where ample head room is required and also where a long reach is desirable. Hoisting and racking gears are shown on these cranes.

Number 68 shows a top braced jib crane which is a type used where a perfectly clear space is desired under the arm. This is a more expensive crane than either of the others shown, and requires a much higher point of support. This illustration shows a wooden crane, but the same design is made in steel and is of course much stronger and more durable when built of this material. In No. 46 will be found a type of crane which can be built at perhaps lower first cost than any other form in use. It is built of wood and is usually employed only for temporary work, or where first cost is more important than economical service. For permanent and economical work the design shown in No. 150 is always better in the long run. No. 191 shows a counterbalanced hand power locomotive crane, which is the simplest form of one of the most useful machines which can be put in a yard where heavy flasks or castings are to be handled. The frame and trucks of this crane are of steel and the machine can be equipped with either a boiler and steam engines or with electric motors for furnishing power for propelling the car and for raising and lowering loads. This design may be built to suit any gage of track and of almost any power. No. 130 shows a column jib crane with a single braced frame which is a type brought into use by the prevalence of shops having high roofs. This crane is designed to swing around one of the columns which support the roof. The column is turned at the points of bearing and the crane turns on anti-friction rollers. Triple braced and top braced frames are also employed for this style of crane. This type is largely used in wings and lean-tos of large shops having traveling cranes and it commands portions of the floor which cannot be reached by the traveling crane. Nearly all of these cranes can be equipped with steam, electric, pneumatic or hydraulic operating attachments, and where a large amount of work must be handled, such attachments are always economical.

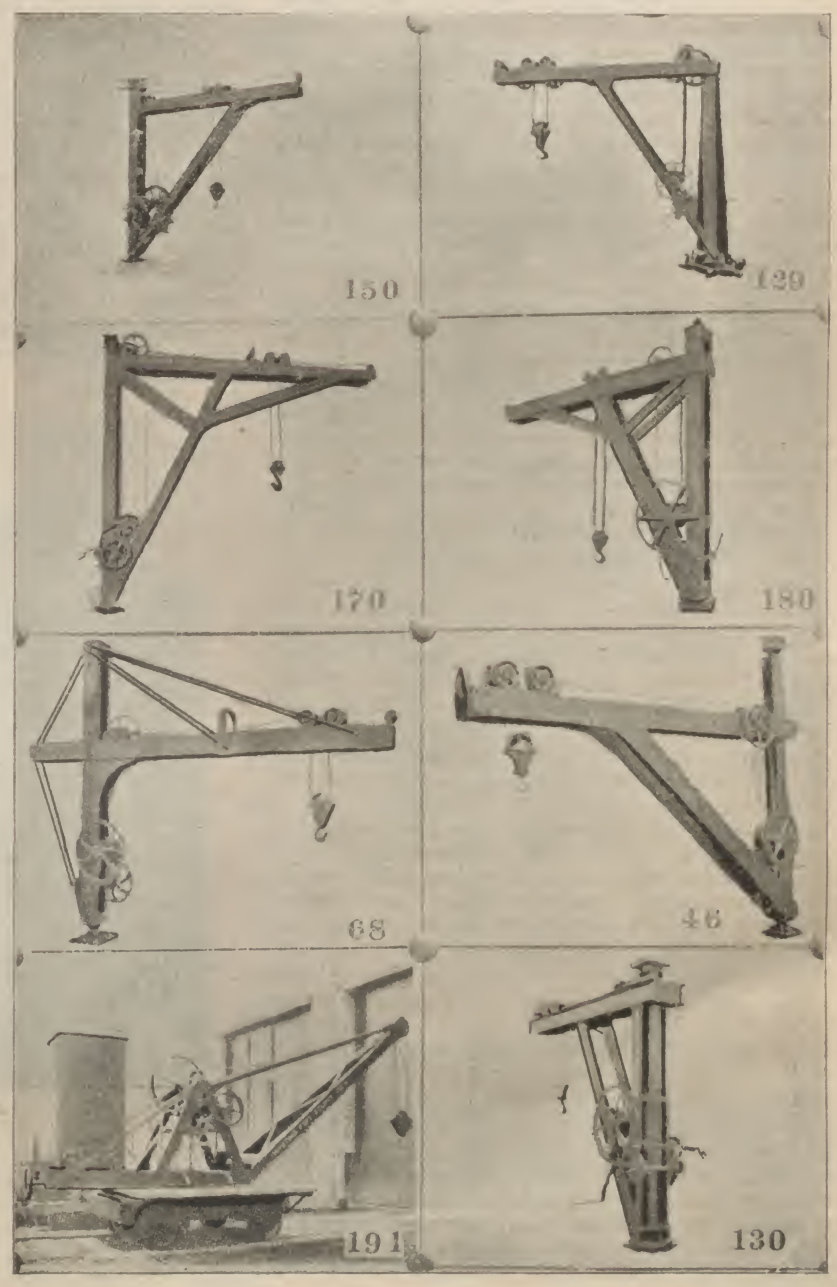


FIG. 11.

CAST WELDED JOINTS FOR STREET RAILWAYS.

The cast welding process of making the rails of street railways practically continuous was illustrated and described in the RAILWAY REVIEW of December 22, 1894. The joints thus made have given such satisfactory service as to attract an increasing amount of attention to the process on the part of street railway men, and also among the engineers of steam lines. The remarkable progress of this method of joining rails is recorded by the Street Railway Review, from which the following information is taken:

"The first joints were made by this process by the Falk Manufacturing Co., of Milwaukee in 1894 in St. Louis. During this year, 60,000 of these joints have been put in, making a total of 100,000 cast welded joints now in use. The work in '96 is divided as follows: At Minneapolis about 12,000 joints have been made part on old track and the rest on new track. The Twin City road is cast-welding all its new track as fast as laid, and old tracks will be welded next season. On the Chicago City Railway 18,000 joints were cast of which two-thirds were on old track. The Cottage Grove cable line work is interesting. Part of the iron had been in constant use for 10 years, including the severe World's Fair service. It was decided to pull up the rails and buy new, when Superintendent Bowen concluded to try a few lengths with cast-weld. The result was so surprisingly satisfactory that the entire division of nine miles was so jointed and the track, which is now as smooth as a floor, bids fair to last another decade.

In Washington, 3,000 joints have been cast welded on old track of 7-inch girder used on the cable service of the Capital Traction Co. for over eight years.

In St. Louis 3,500 joints have been made on very badly worn track of the Missouri Railroad; 2,500 on old track of the St. Louis & Suburban, and 2,000 on an exceedingly bad track of the Lindell, consisting of 52-pound rail on ties spaced to 4 ft. The track as now cast-welded is in excellent condition. In Brooklyn, 3,000 joints were welded for the Brooklyn City & Newtown, on the DeKalb avenue line, 5-in. girder —the worst track the company had, and 5,000 for the Brooklyn Heights, 2,000 of which were on new 9-in. girder.

At Providence, the order called for 1,000 joints on the old Providence girder, but the results were so good that the order was increased to 6,000, and more will be laid next year. As a result of this work, the Winchester Avenue Railway, of New Haven, has put in 3,000 joints and ordered 5,000 more. At Memphis the work was begun in January on a small contract, but one machine is still there at work, and has put in to date 6,000 joints on old and new girder and T rails. In Milwaukee, Manager Wyman made some very severe tests which resulted in installing 4,000 joints, half new and half old track. He is highly pleased with the work.

The work on old rail commands special attention. As every manager knows to his sorrow, in nine cases out of ten, rail that is pronounced ready to scrap is still good except at the joints. By the welding process its life is doubled and often without lifting the iron. The method is to raise the rail ends to a proper hight, by jacks or otherwise, shim the butts up, and then cast weld them. The top of the joint is then ground down, leaving a smooth unbroken surface on a level with the rest of the rail.

During the year the question of conductivity of the cast joint was raised and severe tests made, especially in Milwaukee and St. Louis. The results showed conclusively the joint by reason of its increased area furnishes greater conductivity than the rail section itself. One test was made at Milwaukee by the railway people, who took an old joint, which with the two short pieces of 58-pound Illinois Steel Co., girder rail weighed altogether only 90 pounds. The joint was one of the first made and was much inferior to the joint now cast, and had lain in a scrap heap exposed to the weather three years. This joint, 13 inches in length, was connected up one inch from each end of joint and the entire output of the generator, 720 amperes, passed through it with a drop of only .05 volts. The same length of a 61-strand 1,000,000 circular mil cable was then given a similar test and showed a drop of .035 volt. Another test of equal length of a joint and rail section, both taken from same rail in track, showed decidedly in favor of the conductivity of the joint over that of the rail.

The cast weld is already attracting attention abroad, and M. Abdank, the celebrated French engineer, has ordered a complete welding outfit, which as soon as received, will be used in Lyons, France, where there are 210 miles, which will be cast jointed. Several other large European roads are also negotiating for the system.

AIR MOTOR CARS IN NEW YORK.

It is reported from New York that the officers of the Metropolitan Traction Co. have practically decided to make use of compressed air on some of the lines operated by that company, although the official order for the equipment has not been closed. The experiments in the direction of compressed air traction have been carried on for nearly a year and the results are stated to be highly satisfactory. An important part of the experimentation was carried on at the works of the American Wheeler Engine Co. at Worcester, Mass., under the direction of the Compressed Air Power Co. While these experiments were being made, an engine, an air compressor, and a tank for the storage of compressed air were being put in at the One Hundred and Forty-sixth street terminus of the traction company's Lenox avenue line. The first air motor car with its complete equipment, reached New York from Worcester about four weeks ago. It was installed on the Lenox avenue line and since that time it has been making regular trips from One Hundred and Forty-sixth street down Lenox avenue to One Hundred and Sixteenth street, west along the latter street to Manhattan avenue, and down Manhattan avenue to One Hundred and Ninth street, where it connected with the Columbus avenue line.

Since it entered service the car has not missed a trip and it has been in the regular passenger service all of the time. The storage of air is provided in the form of two steel cylinders about 12 in. in diameter and extending the full length of the car. These cylinders are connected to the air engines by a pipe in which a reducing valve is placed. It is stated that the charging of the cylinders occupied less than 30 seconds. The reports of the trial are exceedingly favorable to the new motor, and the smoothness of its operation and its reliability have impressed the officers of the company who are said to have become enthusiastic advocates of compressed air traction.

A second motor car was received last week and by this time the third has probably arrived, which is to be followed by ten more, all of which are to be used on the Lenox avenue line. The Lenox avenue line is the first surface railroad in the country to be operated by compressed air, and the practical experiments which are being made and are proposed for the future, upon this road will be watched with great interest. The advantages to be derived by this form of power distribution are considerable when it is taken into account that by the use of compressed air, overhead trolley line construction is avoided, and also that it is not necessary to tear up the streets for such equipment, as is unavoidable in an underground trolley system or cable equipment.

NEW POSTAL CAR—CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

A new vestibuled postal car has just been completed at the West Milwaukee shops of the Chicago, Milwaukee & St. Paul Railway which was designed with a view of fulfilling all of the requirements of the United States postal service with regard to the framing, the bracing and stiffening plates. While the details of the construction cannot be presented at this time, the exterior appearance of the car is seen from the accompanying illustrations which were taken from photographs received from Mr. J. N. Barr, superintendent of motive power of the road. An end view is seen in Fig. 1, and a side view is shown in Fig. 2. The car is mounted upon six

FIG. 1.—END VIEW SHOWING VESTIBULE.

wheel trucks with a wheel base of ten feet. the wheels being 38 in. in diameter. The Barr vestibule is used having steps upon one side only, and the vestibule is not included in the interior of the car but is entirely separate therefrom at each end. The door opening from the interior of the car into the vestibule at one end is centrally located whereas at the other end it is at one side of the center.

The length of the car is 60 ft. 10 in. inside of the vestibule and the width over all is 10 ft. The end posts are reinforced by ¾ x 2½ in. iron bars which are bolted to the end sills, the end plates being turned over at the ends for a distance of 7 in. for this purpose. There is a truss on each side between the mail doors composed of a top chord of 1¾ x 7 in. material and braced with diagonals 1¼ x 4½ in. The distance from the top of the side sill to the upper face of the top chord is 2 ft. 3½ in. and the window sills rest directly upon the top of the truss for the four windows at the center of the car on each side. The platform end sills are very heavy as are also the platform timbers which are reinforced by means of ⅝x⅞ in. iron plates on the draft timbers and ⅝ x6 in. plates on the other platform timbers. The side plates of the car are of 3 x 5½ in. instead of 3 x 4¾ in. which is the standard for the coaches on this road. some minor changes have been made in the interior of the car, the principal one being in arranging a part of the shelves at one end to swing out with the table and permit of access to the vestibule. The other end of the car has the vestibule enclosed with doors to permit of passage from this car to the next one, only one end being provided with such a door. We hope to illustrate the car more fully in a future issue.

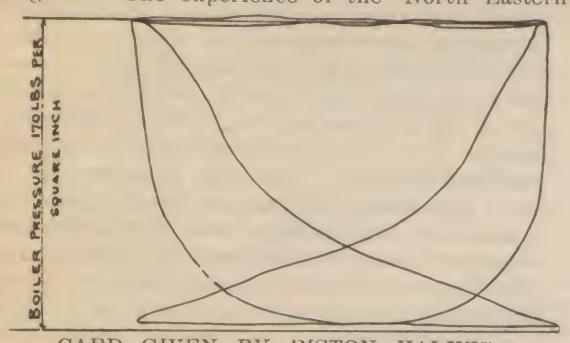
PISTON VALVES ON LOCOMOTIVES.

The application of piston valves to locomotives is scarcely beyond the experimental stage in this country, yet this type has so much to recommend it, and the success which has been met with in practice is sufficiently good to warrant considerable confidence in predicting that it will become one of the leading types. The chief advantage of this form of valve lies in the fact that it is balanced perfectly without the addition of any complication in the form of a flat bearing plate which must be kept true, either by so arranging the surfaces as to compel it to wear true, or else by taking the plate off and correcting uneven wear by machining. The committee on slide valves in reporting to the Master Mechanics' Association last summer, stated that 145 locomotives had piston valves, at that time most of these being upon compounds, and as replies were not received from all members, it is possible that there are more than this number in actual use in this country. It is interesting to note that according to this report all expressions in regard to piston valves were favorable with one exception, this being a road with five compound locomotives having these valves, the service of which was rated as poor. An application was made with this type of valves upon a single expansion passenger engine on the Chicago, Burlington & Quincy Railroad last year and the neatness of the construction together with the unexposed position of the steam chest, the directness of the steam passages and the fact that the connection to the valve stem was made inside of the driving wheels, comprise additional reasons why this type would seem to offer special inducements to designers.

In the RAILWAY REVIEW of September 14, 1895, illustrations were given of the method of applying piston valves to the locomotives of the North Eastern Railway of England from the designs of Mr. Wilson Worsdell, locomotive superintendent. These valves are also referred to in the issue of March 2, of the same year, in which some exceedingly good indicator cards were presented. One of the features of this design of piston valves lies in the fact that the wearing parts may be readily renewed, as the valve pistons work in short sleeves which may be replaced when worn. In answer to a request for information with regard to the operation of these valves, Mr. Worsdell writes that since last year they have been applied to ten additional locomotives and that they do excellent work; they run very freely, give no trouble and are well liked by the drivers. He sent a copy of an indicator card taken from engine No. 1526 at a speed of sixty miles per hour on May 21, of

FIG. 2.—SHOWING SIDE VIEW OF CAR.

this year. The card shows the line of boiler and steam chest pressures as well as the indicator diagram. The experience of the North Eastern



CARD GIVEN BY PISTON VALVES.

Railway has been such as to lead other English lines to use these valves and Mr. W. M. Smith, the patentee of the form used on the North Eastern Railway writes that the system of combined piston and release valves which he designed is making considerable progress in England. There seems to be no doubt that he has succeeded in bringing out a piston valve which is suitable for locomotive work. The Midland Railway has 25 locomotives fitted with these valves, ten of which are single driver express locomotives, with 19x26 inch cylinders, with 90 inch driving wheels. Ten of them are four wheeled coupled locomotives with 19x26 inch cylinders and 84 inch driving wheels, and five locomotives which are now building are to be fitted with these valves and are expected to be among the finest passenger engines in England, having 19½x26 inch cylinders, and 93 inch single drivers. The Highland Railway has applied these piston valves to 15 locomotives and Mr. D. Jones, locomotive superintendent of this railway, is reported to have had very successful results with them. The Highland Railway has grades twenty miles in length consisting often of 1 in 75 and 1 in 80. The locomotives have 19x24 inch cylinders and four-coupled driving wheels. 75 inches in diameter. No trouble is experienced in climbing these hills at a speed of 45 miles per hour.

It is unfortunate that so few tests have been recorded whereby the power required to move piston valves may be compared with that absorbed by other types. A notable example of such a comparison is in a series of tests made on the Northern Pacific Railway last year wherein the average indicator pressure required to move the piston valves compared with that required to move a balanced valve slide, was as 26 is to 101, the apparatus employed being similar to that which is used by the committee of the Master Mechanics' Association in the report referred to. The radical change from the present common form of slide valve cannot be made in a hurry but the accumulation of favorable experience with the piston type along with the important constructive advantages which may be gained by its use will unquestionably lead to a more general introduction, and unless faults develop which are not at this time looked for, the type will probably come into much more general use. The statements with regard to the operation of piston valves by those who are using them, are exceedingly guarded especially as concerning foreign engineers, but they are nevertheless favorable. Mr. Wilson Worsdell, stated before the International Railway Congress in the discussion of the subject of express locomotives in 1895, that he had not at that time had sufficient experience with piston valves to give a positive expression of opinion in regard to them. He said:

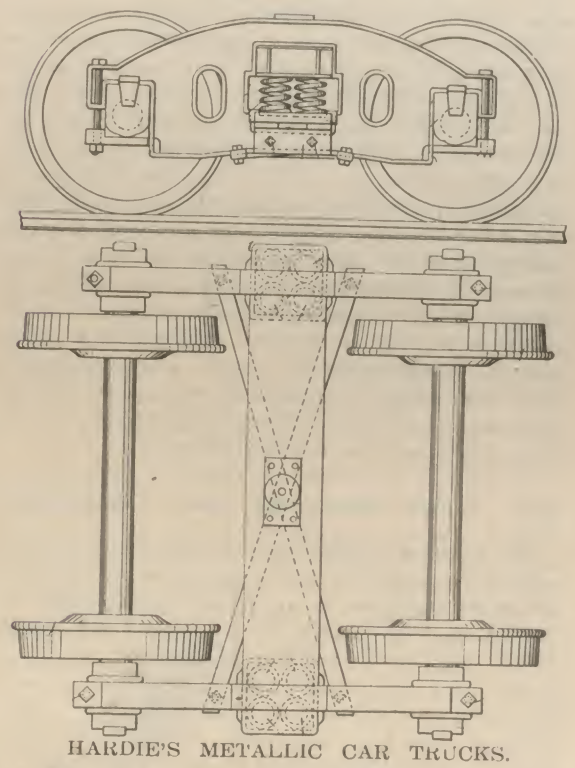
"We are experimenting with balanced valves, and I am now building ten engines and putting on the piston valve to engines, but that has been done so very recently and the engines have been working for so few months that we would rather not say anything about them on this occasion. I might just mention with regard to the piston valve, that although we have had only some six months experience in the working of these engines, yet I have put these five engines working in express trains against ten engines of a similar class and the consumption of fuel in the last six months has affected something like 10 per cent saving; but whether that will be carried on in the whole 12 months running is yet to be seen. I do not think the results that have been arrived at would be worth putting down on paper, because they are not at all reliable. We have so far been nursing the engines, but after 12 months working we shall be able to arrive at absolute facts."

In view of this statement Mr. Worsdell's recent expression of opinion upon the subject has the more weight.

More than half of the locomotives in use in Southern California have been converted into oil burners, and that improvement is still in progress. The discovery of petroleum in Los Angeles furnishes a fuel considerably cheaper than coal for use in Southern California, and the results obtained from its employment are gratifying.

HARDIE'S METALLIC CAR TRUCK.

The accompanying illustrations show the method of construction of a new metallic car truck designed and patented by Mr. J. S. Hardie, of ElDorado, Kas., the form of which is such as to permit of casting the principal members either in malleable iron or steel. The side frames are approximately U shaped in cross section with the top and bottom flanges extending outwardly from a longitudinal web, and the bottom flanges of the frames are connected with each other by cross braces near the middle of the truck, as is plainly indicated in the illustrations Figs. 1 and 2, of which Fig. 1 is a side elevation and Fig. 2 a plan view. In each of the side frames a transverse opening is provided with flanges upon which a com-



HARDIE'S METALLIC CAR TRUCKS.

pression wedge rests. On top of this is a tray shaped spring seat provided with lugs which span the sides of the flange to secure the spring seat in place in the opening. The spring seat is provided with a flange on its underside which is drilled for a bolt to secure it to the web of the frame. The springs are of the spiral form and they are seated in the tray referred to, and upon them the truck bolster rests. The ends of the bolster are reduced in section to permit them to pass through the side frames for this purpose. The side frames are recessed for the journal boxes as shown in the illustration. The chief claims for the construction are that its design permits of making the members very strong and that its parts are few and so arranged as to be readily put together without skilled labor.

TEST ON AN UPRIGHT WATER TUBE BOILER.

An interesting description of a number of trials on a Cahall boiler has been received which gives the figures of nine different tests on the same boiler when made for economy and for capacity. These tests were made by five different sets of observers, and they were conducted for the purpose of determining the exact performance of this boiler with reference to other water tube boilers of a well known make. They were made upon the boiler of the Armstrong Cork Co., of Pittsburgh, Pa. The tests were made with different coals and covered a period of eight months, and it is stated that during this time the tubes in the boiler were not scraped or cleaned. The results are very uniform and the efficiency found bears almost a direct fixed ratio to the capacity in each test, the maximum efficiency being about 70 per cent with the boiler driven at double its rating, and the maximum efficiency was 85 per cent when the boiler was running at about its normal horse power. In these records it is interesting to note the quantity of water evaporated for a dollar's worth of fuel, and the cost in cents of producing a horse power for an hour. The cost of producing steam for shop plants is an item which may be said to have been neglected on a great many railways and yet it is believed to be a subject worthy of improvement, and it will be interesting to know how many such plants can be made to give results like those which are contained in the following table, which gives the average of the nine tests already referred to:

Duration of test	8 2-9 hrs
Average pressure of steam by gage	98.8 lbs
Average temperatures—	
Of feed water entering boiler	62.6 deg. F
Of steam in boiler	334.2 deg. F
Coal—	
Cost per ton of 2,000 lbs. delivered	$1.01
Calorific power by calorimeter	B.T.U. 12.770.9
Total quantity consumed	10,132.8 lbs
Total ash, clinkers and unburned coal	975.06 lbs
Proportion of ash, etc., to coal	9.69 pr. ct
Total combustible burned	8,961.94 lbs
Combustion per hour—	
Coal actually consumed	1,190.29 lbs
Combustible actually consumed	1,082.79 lbs
Per square foot grate surface—coal	31.03 lbs
Per square foot grate surface—combustible	32.54 lbs
Per square foot heating surface—coal	.47 lbs
Per square foot heating surface—combustible	.43 lbs
Water—amount apparently evaporated	86,199.08 lbs
Factor of evaporation	1.20
Equivalent evaporation into dry steam from and at 212 deg. F.	103,007.73 lbs
Economic evaporation—per pound coal—	
Water actually evaporated	8.735 lbs
Equivalent from and at 212 deg. F	10.43 lbs
Per pound of combustible—water actually evaporated	9.1106 lbs
Equivalent from and at 212 deg. F.	11.5869 lbs
Evaporation per hour—	
Water actually evaporated	10,448.57 lbs
Equivalent from and at 212 deg. F	12.582.82 lbs
Per square foot heating surface—water actually evap.	4.03 lbs
Equivalent from and at 212 deg. F	4.9571 lbs
Per square foot grate surface—water actually evaporated	298.53 lbs
Equivalent from and at 212 deg. F	320.68 lbs
Efficiency—	
Percentage of total calorific power utilized, or efficiency	77.867 pr. ct
Water evaporated per $1.00 worth of fuel	19,858.47 lbs
Cost of evaporating 1,000 lbs. of water	.0498 cts
Coal consumed per horse power per hour	3.35 lbs
Cost of same	.0001724 cts
Horse power—	
Actually developed on basis of 34½ lbs. water evaporated per hour from and at 212 deg. F	364.708
Commercial rating	250.0
Proportion, capacity developed of commercial rating	145.859 pr. ct
Heating surface required to develop one horse power	7.3602 sq. ft

INFLUENCE OF QUALITY OF COAL ON COST OF OPERATION.

The fact that much more water may be evaporated by burning good than by burning poor coal is well understood, and yet there is a tendency on the part of some officers who are responsible for the purchase of locomotive fuel supplies, to ignore the advantage in quality of coal for the purpose of obtaining a slight advantage in the price per ton. It is not always necessary to get the best coal regardless of price, but the price should not interfere with the use of coal which is enough better than a cheap grade to more than overbalance some additional cost. In this connection, Mr. G. D. Brooke, master mechanic of the St. Paul & Duluth Railroad, gave testimony in a discussion recently held before the North West Railway Club upon the subject of "Fuel as it is Used and Abused" in the following quotation:

Some six years ago, I was called upon to make relative tests between Hocking Valley and Youghiogheny coal for determination as to which should be continued in use on our road. At the time there was a difference of only ten cents per ton in favor of the Hocking Valley. The first test was with the Youghiogheny coal during the months September to April, inclusive, of 1890, and included the entire consumption of coal during the interval. The cost was $3.30 per ton and the result for the eight months was as follows:

Cost per engine mile, 9.8c.
Miles run to ton of coal, 34.4.
Pounds of coal per car mile, 8.28.
Cost per car mile, 1.39c.

For the corresponding eight months of the ensuing year, 1891, the test was made with Hocking coal. The cost was $3.20 per ton on all engines, with following results:

Cost per engine mile, 11.06c.
Miles run to ton of coal, 29.50.
Pounds of coal per car mile, 9.75.
Cost per car mile, 1.59c.

To still further verify the economical advantages of using Youghiogheny coal, the record for the use of that coal for the corresponding months of the next year, 1892, was as follows:

Cost of coal, $3.40.
Cost per engine mile, 11.02c.
Miles run to ton of coal, 31.10.
Pounds of coal per car mile, 7.23.
Cost per car mile, 1.24c.

It was then decided that the Youghiogheny coal was the more economical of the two for our use, and no change has been made since that time. Since then, however, we have improved very materially in its use, and our record for the last fiscal year ending June 30 shows as follows:

Miles run to ton of coal, 33.04.
Cost per engine mile, 9.13c.
Coal consumption per ton mile, 0.34 lbs.
Average cars per train, 30.93.

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CHICAGO, SATURDAY, NOV. 14, 1896.

ADVICES received since last Tuesday week warrant the conclusion that a considerable expansion of industrial activity is taking place. Stocks of finished goods in all lines are low. The movements in financial centers point to greater ease. Orders received in large industrial centers give the assurance that many interests have decided to look after current requirements. A decidedly better feeling prevails, but it is problematical yet how much new business will be done. There is a widespread feeling among car-builders that they will soon have more to do. Steel rail makers are in expectation of considerable business. In response to a few special inquiries it is learned that specifications are now being made out for more or less bridge work, on which mill prices have been already secured. The entire market has a stronger tone, but prudence is at the helm of affairs, and manufacturers are too anxious for business to trifle unnecessarily with quotations.

THE Board of Administration under the new western freight agreement as finally selected, consists of J. W. Midgley, chairman, and Messrs. C. L. Wellington, C. A. Parker, H. H. Courtright and H. L. Shute. The character of the board gives ample assurance that the administration of the agreement will be wisely and efficiently performed. The territorial rule originally adopted for the selection of the board was an unfortunate one. Personal qualifications rather than geography should have been the only consideration in such selection, and it mattered not so long as the right men were obtainable whether they were all found in a single city or in widely separated districts throughout the country. Fortunately, the outcome has been most happy, but it was rather in spite of than because of the rule. In the organization of the new association, a sharp contrast is presented to that of the Joint Traffic Association, and it will be interesting to note and compare the degree of efficiency with which the affairs of the two associations are administered.

EASTERN railroads have been lately exercised over the alleged discovery that certain private car companies have been paying rebates to shippers employing their cars, and it is asserted that if found to be true the roads will refuse to haul such cars *until the practice is stopped.* Admitting the proposition to be true, the proposed remedy is about as absurd as the present practice of hauling the cars is unwise. It ought not to be difficult for the majority of our railroad officials to argue from their own experience that if a car company whose revenue is dependent upon mileage finds its cars standing unused on the sidetrack, it will not long hesitate to divide its revenue with shippers in order to secure employment for its equipment. It is susceptible of proof that these cars are exceedingly profitable to their owners, a return of even more than fifty per cent per annum being known to have been paid. In fact, the private car business has come to be recognized in many quarters as one of the worst parasites attaching to the railway service, as well as one of the least defensible. Instead, therefore, of refusing to haul their cars until they agree to abandon the practice of rebating to shippers, the roads should refuse to haul the equipment of private car companies upon any terms except payment for service rendered.

THE recent decision of Judge Sage of the United States circuit court for the Southern district of Ohio in the case of the Interstate Commerce Commission against southern roads, brought to compel obedience to the commission's ruling concerning certain rates, has attracted considerable attention in railroad circles. In the absence of the full text of the decision it is manifestly improper to indulge in any extended comment on the case, but if, as is understood, the court holds that railroads are free to make contracts which practically ignore the long and short haul clause of the interstate commerce law, the decision is not likely to be regarded as final. The decision is also reported to declare against the right of the commission to prescribe rates either generally or in specific cases, holding that it is limited to the question of the reasonableness of rates. It would appear that this last proposition is one of common acceptation and naturally leads to the query if the object of the law could not be fully carried out, if the commission instead of prescribing actual rates in given cases would declare the maximum and minimum limit of reasonable rates. It is unfortunate that in the early days of the commission, that body, in an opinion by Judge Cooley, took the position that inasmuch as railroads were able to protect themselves, a ruling against unreasonably low rates was unnecessary. The lapse of time has proved the fallacy of this proposition, and it is hoped that early occasion will be taken to rescind this unfortunate rule.

HIGH STEAM PRESSURES FOR LOCOMOTIVES

The question of using higher steam pressures in locomotive practice has recently attracted considerable attention, and there are evidently advantages to be derived from increasing the pressure to a moderate extent, say up to two hundred pounds per square inch. Such an increase as this is entirely practicable. The theoretical gain to be expected over pressures of one hundred thirty pounds per square inch is in the neighborhood of twenty per cent. A locomotive with 18 x 24 in. cylinders and driving wheels 72 in. in diameter, with 150 lbs. boiler pressure, should be able to haul on a level a maximum load of 2,400 tons. The same engine working under a pressure of 190 lbs. per square inch should be able to haul nearly 3,100 tons, which represents a difference of nearly thirty per cent in the hauling power at very slow speeds, by the increase of forty pounds pressure above one hundred fifty pounds per square inch. This advantage, however, would not be found under all conditions of speed and load, because a locomotive with a lightly loaded train and with anything like free steam passages would be obliged to work at such short points of cut-off, especially if the cylinders were large, as to offset the advantage of power gained by the increase in pressure.

An advantage would be derived from the fact that the steam would be dry on account of the throttling which would cause superheating before the steam reached the cylinders. Consideration of the influence of the cut-off upon the economy of working will show at once that there is a practical limit to the increase of pressure which will very soon be reached with single expansion engines, and those who put up the pressure of such engines should not be surprised to find that the theoretical advantage when figured from constant load at the most economical point of cut-off, is not borne out by the coal records. There is no doubt whatever of the use of somewhat higher pressures being economical. The boiler work can be made to stand the pressure and if necessary can be made competent for still higher duty, but on the whole it is doubtful whether it will pay to increase above about two hundred pounds in simple locomotive engines.

In marine practice the conditions are so different as to be entirely incomparable with those surrounding locomotives, chiefly from the fact that marine engines are designed with a view of taking advantage of all that may be gotten out of expansion, without the losses which are found in perhaps the same degree of expansion in a single cylinder where the difference in the temperature at different points in the stroke causes so much interchange of heat between the cylinder and its contents, as to render the operation decidedly uneconomical. The reasons for advocating high pressures in locomotives constitute strong arguments for the employment of the compound principle, and it is in connection with this form of design that they will be found really advantageous. The advocates of high pressures in marine practice have gone to extremes in suggesting the use of pressures as high as one thousand pounds per square inch, and perhaps from the fact that such pressures have been mentioned, an impression has been created that some similar increase in locomotive practice would prove to be a panacea for all the ills of the locomotive. The thousand pound theory however will not hold up under a searching inquiry in which practical conditions of operation are considered, even in marine practice with its multiplicity of cylinders, and it is exceedingly doubtful whether pressures above two hundred and fifty pounds in that service will be found practicable and satisfactory. Two hundred and twenty-five pounds pressure on the steamship "Inchmona" has apparently been a perfect success, but even that pressure is far in excess of what would seem to be economical with the sizes of cylinders ordinarily employed in single expansion locomotives.

It would be interesting to note the practical effect of increasing the boiler pressure of a locomotive to say two hundred and twenty-five pounds and reducing the size of the cylinders to such an extent as to permit of using comparatively long cut-offs for the average work which the engine is called upon to perform. So far as known no suggestion has been made in this direction, and it may be possible that the results might justify an increase under these conditions, but how an improvement can be obtained by increasing pressures to any considerable extent with the present size of cylinders and other prevailing conditions, is not apparent.

BICYCLES AS BAGGAGE.

Inasmuch as the question of free transportation of bicycles is likely to occupy the attention of the passenger officials during the coming months, it may be well to offer some word of caution lest the extreme pertinacity with which the claim will be urged may be mistaken for a justification of the proposition. The cycle trade press are a unit in demanding that this concession be granted, as well as untiring in their efforts to induce wheelmen generally to unite in favor of the move: but the best reason they have been able to offer in support of their demands is that the wheelmen are numerous enough and influential enough to compel a compliance therewith. It may be well, therefore, to state a few of the reasons why this demand should not be granted.

In the first place, it is probably true that bicycles should not be handled by railroads as baggage either with or without compensation. The character of the article is such as to make it unfit for transportation as baggage. In the nature of the case, baggage is handled with a degree of celerity and consequent roughness that renders its application wholly unsuited to fragile articles. At many stations the baggage room is more or less distant from the point at which the baggage cars are loaded and unloaded, and bicycles must be led across platforms crowded with passengers to the risk of the one and the inconvenience of the other. Not only so, but the services of a man are required for each two wheels, thus requiring, in case many wheels are to be loaded, the consumption of much valuable time. The bicycles also cannot be piled like other baggage, either in the baggage room or car, nor, unless carefully placed will they stay put. Further they are extremely liable to damage, and often reach destination in a condition unfit for immediate use. Other reasons, such as the moral effect upon the baggagemen because of their being obliged to handle bicycles, might be mentioned.

It is probable, however, that railroads will concede the point of suitability and accept bicycles for transportation in baggage cars subject to some proper restrictions. In such event there is certainly no justice in demanding that in addition to carrying the wheels, they shall be carried without extra charge. Bicycles are not baggage, any more than a

dog is baggage, or a baby carriage, or a row boat. Baggage is defined in Webster, as the trunks, valises, satchels, etc., that a traveler usually takes on his journey. In railroad usage, it was originally designed to cover the necessary wearing apparel of travelers. This limitation has been because of sharp competition extended to include the sample cases of commercial travelers, but to extend the application of the term to bicycles would be to altogether transcend the original idea, and open a wide door for the transportation as baggage of all classes of articles. The charges which are at present made for the carriage of wheels are certainly reasonable. No wheelman would be deterred from taking his wheel to any point at which he desired to use it because of the present tariff, while from the railroad standpoint no less charge could be made if an actual money loss growing out of such traffic is to be prevented. In fact, it is more than doubtful if under the present schedule of charges, railroads are not actually losers by the business.

But the main word of caution needed at this time is that railroads should carefully consider the lengths to which this demand for free transportation is likely to go unless it is promptly and effectually checked. Under the stress of competition, the bars have been already let down in altogether too many directions. Railroad transportation to be efficient must be profitable. It is probably true that concessions have now been carried so far as to wholly eliminate this factor from passenger transportation. The reduction of rates on the one hand and the furnishing of excessive facilities on the other have created such a bill of costs to make it imperative that the further restriction of charges, and a further enlargement of outlay be immediately ended. It is not astonishing that the men who make the demand for free transportation of wheels should be so insistant upon what they deem their rights in the matter, for they are honest although ignorant of attendant conditions, but it is surprising that in railroad circles should be found men who support them in their claims.

It may not be out of place to state that the editor is a member of the L. A. W., the journal of which organization is pronounced in favor of the free transportation of wheels, but until some better reason for advocating the plan than the desire to get something for nothing can be given, this journal will be opposed to the further sacrifice of railroad revenue for such an inadequate reason.

THE USE AND ABUSE OF RAILWAY CLUBS.

The object for which railway clubs have been organized in this country is usually stated in the constitutions to be "The advancement of knowledge relating to safe and economical railway operation and to the construction, maintenance and service of railway machinery, motive power and rolling stock, by discussion in common, investigation and reports of the experience of their members," or in similar terms. There are other objects but this is enough to answer present purposes. The clubs have done such creditable work in the direction outlined, as to advance the knowledge of methods of safe and economical operation of railways in a way which would perhaps have been impossible by any other means, and in the published proceedings these organizations are putting into print some of the most interesting and valuable matter now placed before the men who are specially interested in them. These clubs record progress. They furnish means for studying and understanding the effects of improvements. They make it possible for the experience which is gained by individual experimentation to become a guide for others, and it is made possible to prevent unnecessary duplication of investigations. They furnish a medium for interchange of ideas and tend to improve the art of railway working. They help to keep roads out of ruts, while the educational features of the organizations are too well understood to necessitate dwelling upon here.

It is becoming noticeable that the higher officers of some roads are beginning to look askance at the clubs, because of a fancied danger that information furnished through this medium will enable competitors to profit by their experience. These same officers admit the value of the club proceedings to their own roads, but do not wish their subordinates to contribute to the general information which is disseminated in this way. They do not object to showing the methods by which they carry out their own work when others are willing to go the trouble to seek the information, but they sometimes go so far as to request subordinates to refrain from talking before the clubs, lest competitors should be enabled to make use of information gained in this way. This feeling is not general by any means, but its extent is sufficient to call out a protest against such a policy which not only cannot but be considered unfair and unwise but seems certain to defeat the object desired, which is the greatest possible progress in the direction of net earnings.

The aim of these clubs will be defeated if this attitude proves contagious, but in all probability it will not and it is the object of these paragraphs to show that the greatest progress is made by those who speak of their experiences freely. A writer of the eighteenth century said: "That man may last, but never lives, who much receives but nothing gives." Another writer said: "There was a man, though some did think him mad, the more he cast away the more he had." One cannot impart information concerning his experience without securing benefit from the very telling of the results. It is not necessary to tell all that one knows but it is to the advantage of the community that the results of experience should be published. A discoverer in the medical field does not keep the results of his investigations to himself, but offers his observations to others for the benefit of the profession. Such information does not hurt him or injure his chances for success, but it has the effect of broadening his view and widening his experience. What he imparts to others is merely information, and this does not place his competitors, who have not had the experience, in a position to do him harm. A newly graduated law student has plenty of information, but who is willing to employ him on important cases. He lacks experience. A person who takes up a suggestion from reports of successful experiments must always be a follower until he becomes an originator. A man who is broad minded enough to put his work on record in a paper will be ahead of his competitors, and while they are considering what he has done he is doing something else and thus always keeps in advance. In return for what he gives he is receiving hints and suggestions which are valuable to him and which help him to "keep up with the procession." The officers of a road may send representatives out to see what other people are doing and get information without giving an equivalent therefor, but "the man who follows another's lead is always behind." A contemporary, *Engineering*, in speaking of discoveries which cannot be made the subject of a patent says:

They are so difficult to keep to oneself that it is speculation of a hazardous kind to endeavour to retain them for long. When the first fruits have been reaped, it is sound finance to barter what remains for reputation. The gain to the community of such a course is immense, as it furnishes stores of knowledge which will exist for all time. Changes of circumstances often throw an art into abeyance, and when it is again desirable to revive it, an immense amount of unnecessary labor has to be undertaken before even decent proficiency is attained, unless the records of the former practitioners can be found. To deliberately hide them is to act like a traveler from an almost unexplored land who refuses to the Geographical Society the sketch map in which he has marked his daily astronomical observations. It betrays the conviction that his success has been due to luck and not to ability, and that he could not repeat it in another field.

This desire to keep subordinates quiet may be inspired by a wish to keep them from public notice. A man who writes an able paper attracts attention to himself personally and it may become necessary to offer him inducements in order to retain his services. A man who is able to contribute valuable professional information in this way is generally progressive, and he is made more so and consequently more valuable to his employers by having attracted attention because of the stimulus given him by the process. A case comes to mind in which a young man by writing two important papers called so much attention to himself that his employers found it necessary to advance him rapidly in salary and position in order to keep him in their service. Did the road suffer in consequence? The man was encouraged his salary was raised and he became more valuable. The problems which face a railway manager to-day are perhaps more perplexing and more difficult to handle than those of any other position in business life. He needs the best of assistants in order that he may be successful and anything which will improve the work of subordinates will redound to his credit and contribute to his success. A subordinate cannot be held back without a loss to his employers and the interests of a road will undoubtedly be best served by urging the men to their best efforts, even if they must be paid large salaries to keep them from going elsewhere. If a road is to merely educate men for positions on other roads the holding back policy will answer very well; but if the object is to increase constantly in proportion as the difficulties in profitable operation increase, advantage must be taken of the best that lies in the subordinates. Keeping them under lock and key or otherwise attempting to withhold them from public notice will tend to make them mere machines, instead of thoughtful progressive assistants. It is fair to say that some of the best motive power men owe a large part of their success in economical administration of their departments to their parts in the discussions of the railway technical organizations.

BLANK FOR REPORTING IMPROPER REPAIRS TO FREIGHT CARS.

The discussions which are now going on before railway clubs with reference to the disposition of improper or "wrong" repairs to freight cars, show how important it is to place all matters having to do with the interchange of freight cars upon a systematic basis. There must necessarily be a great deal of correspondence connected with the repairs of cars, and anything which will render the records convenient and clear will enable the work of car builders to be lightened and the expense of office records to be made less. A copy of a blank for the purpose of keeping a record of improper repairs has been received from Mr. A. M. Waitt, general master car builder of the Lake Shore & Michigan Southern Railway which should greatly simplify records of such repairs. This card is printed on both sides and the form is represented by the following copy.

C. 2023.

Lake Shore & Michigan Southern Ry. Co

REPORT OF IMPROPER REPAIRS TO L. S. & M. S. CARS.

Station.....189..

Car No.....*Initial*...*Received from*....*Ry. At* ....*Date*....189..

Description of wrong repairs.... | *How Repairs should be made*....

We certify above to be correct. { ..*Inspector for L. S. & M. S. Ry* ..*Inspector for*.....*Ry*

Show how carded on other side.

C. 2023.

Lake Shore & Michigan Southern Ry. Co

M. C. B. Defect card. *Issued by*.....*Ry. At*.....*Date*.....189..

Inspector.....*Reading as follows* .....

M. C. B. Repair Card. *Issued by*..... *Ry. At*.....*Date*.....189..

Inspector.....*Reading as follows*.....

Disposition of Car. *Carded to*...*Shop; Repaired; Went forward without Repairs*.....

Under the present M. C. B. rules, as joint evidence of improper repairs is required in order to render bills for such repairs, it would seem necessary that some such form as the one gotten up by Mr. Waitt should be put into general use. Like other matters, where no standard is adopted by the association, a large number of different forms will spring up and be used. Mr. Waitt believes that the form that he has adopted, after considerable thought and discussion, is one that could very properly be put into general use, and even made a standard M. C. B.

Association form for use as a voucher in connection with bills for wrong repairs. Such use of the card would obviously simplify the correspondence and the records of such repairs. The rules under which the card is used are as follows:

To all master car builders and foremen car inspectors L. S. & M. S. Ry.

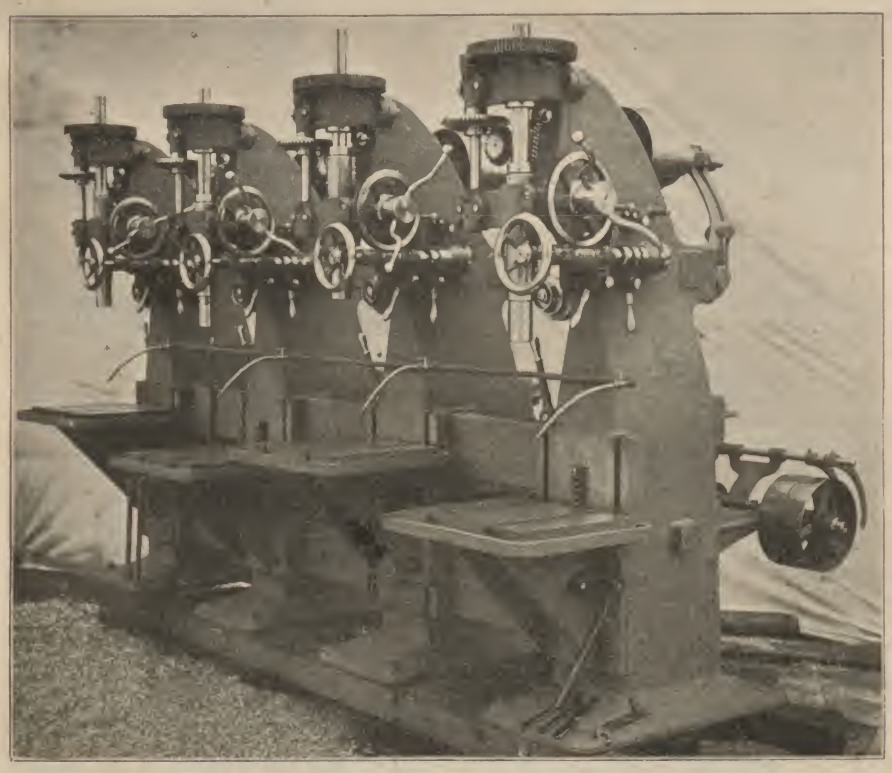
Hereafter, whenever "Lake Shore" cars are returned with repair cards or defect cards on them, or bearing indications of having been recently repaired, examination should be made to see whether or not the repairs have been properly made. If they have been properly made, and the car is all right, the repair card is to be removed and marked O. K., with the date when the inspection was made. The signature of the inspector is to be affixed and the card sent in to the division master car builder, and he in turn is to send it to the general car inspector.

If the cars are found to have improper repairs, the cards should be allowed to remain on the cars until proper repairs are made. In such cases loaded cars are to be carded to the shop nearest their destination, and empty cars are to be carded to the nearest repair track or shop where proper repairs can be made. In cases where wrong repairs are found, a report is to be made out on form C 2023, the report to contain detailed description of the wrong repairs and of the cards on the car, certified to by our inspector and also by an inspector, or representative, of the delivering road. If wrong repairs are found and the car does not have a repair card on it, the same description of the wrong repairs, certified to in the same manner, should be made.

In connection with this report, all the data called for on the blank should be given, and the report should be forwarded to the division master car builder, and he in turn should forward it to the general car inspector. In all cases where L. S. & M. S. Ry. cars arrive at the shops with improper repairs, a report is to be made to the general car inspector, on the same form as is used by inspectors for reporting such repairs. Instructions will be issued from the general office as to whether bills will be rendered covering cost of correcting the improper repairs on cars.

MULTIPLE SPINDLE DRILL PRESS.

The illustration presented herewith is reproduced from a photograph of a heavy multiple spindle drill press specially designed for turning out a large amount of duplicate work where accuracy is important. The machine can be used in a great variety of work, but has been extensively used in bicycle factories for drilling holes 1½ in. and 2 in. in diameter, and it is stated that holes 1 13/16 in. in diameter, and 3⅛ in. long are being drilled with this machine in steel at the average rate of one hole every six minutes and twenty seconds, and holes 1½ in. in diameter and 3¼ in. long at the rate of one every three minutes. The frame casting is of box form. The spindle is 2⅛ in. in diameter made of crucible steel, and has a vertical travel of 8 in. The table is 20x17 in., exclusive of the oil groove and has a vertical adjustment of 12 in. There are four changes of speed and three changes of feed, and each spindle has an automatic power feed, lever feed, hand worm feed and an automatic stop and quick return. An oil pump with piping forms part of the equipment. The machine shown is practically four independent machines coupled together and the design permits any desired number to be thus coupled, as each spindle is independent in all its movements. The machine is manufactured by Baker Bros. of Toledo, O., and although comparatively new it has met with large sales.



A NEW MULTIPLE SPINDLE DRILL PRESS.

CAR LIGHTING IN EUROPE.

The bulletin of the International Railway Congress for September contains an interesting report of the discussion on the subject of car lighting held at the London meeting of that organization last year. All of the various systems now in use were discussed, but the greatest share of attention was given to gas and electricity as the most important ones. Mr. Chaperon, of the Paris, Lyons & Mediterranean Railway, reported on the use of electricity as follows:

"We have tried electric lighting by means of accumulators, and fairly extensively, too, for the experiment was made on 50 carriages. All our other carriages are lighted by gas, and for the last two years, during which time we have been trying electricity, I have become more and more convinced that gas is better, not perhaps in lighting power, but in convenience and regularity. In fact, in lighting trains, there are two things to be considered, candle power and ease of working the apparatus.

The great advantage of gas is that it is easy to manage. The carriages can be charged quickly, and the pressure gage enables us to know how much is stored. There is more difficulty with the accumulators, and you never know how much there is left in them. We have, it is true, fitted up a clockwork apparatus which indicates how long the accumulator will still run, but naturally that depends upon whether the accumulator is in good working order. Still, the light often gets dim or goes out on the way, and this arises either from the lamps or the connections going wrong, or more often from the accumulators being defective. All this makes me say that so far, and until some other method of producing electric light with better results, either in action or in cost has been discovered, I still prefer gas as being on all accounts a more satisfactory illuminant for railway carriages."

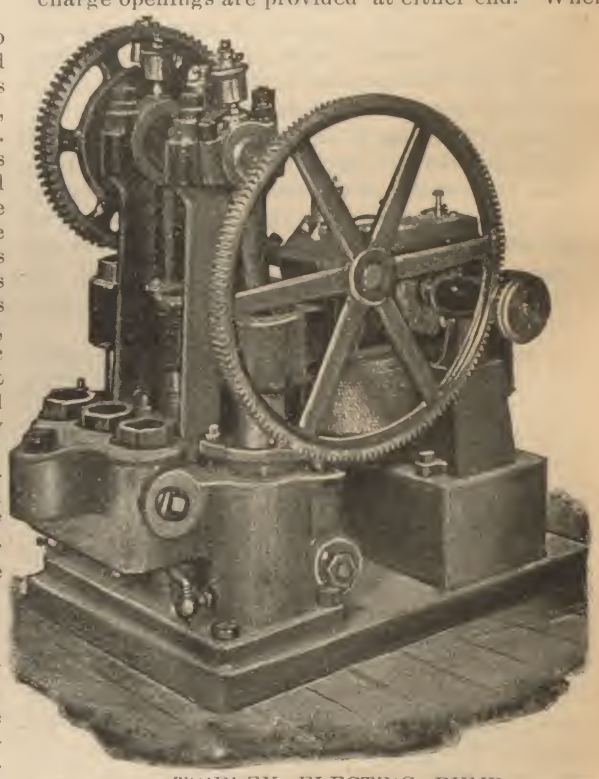
Mr. Gain, of the International Sleeping Car Company, then said: "We have tried several methods of electric lighting; among others, one by means of accumulators and another by dynamos. The latter we had to give up because it proved too expensive. The dynamo was situated in a 6-wheeled brake van, and was worked by a pulley fitted to the center axle, which was not braked. We had besides a few accumulators to supply light durring stoppages, and though we were able to surmount the mechanical difficulties inherent in the system, we had, owing to its cost, to give it up and return to a simpler method not requiring a special staff, namely, electric lighting by means of accumulators.

"As regards carriage lighting, I would like to call your attention to the experiments we are making on incandescent lighting. Though a new thing, this method of lighting with rich gas seems to have a future before it. With an Auer burner we have lately got an intensity of 23½ candles per burner consuming nearly 5 gallons of oil per hour, that is about 2 gallons per 9½ candles. This means an economy of 77 per cent as compared with ordinary lamp burners which consume nearly 9 gallons per 9½ candles. Before trying this incandescent burner on our carriages, we made some laboratory experiments. We next tried it on the Havre line, and the cone causing the incandescence acted well owing to an arrangement of supporting it on springs This is only in the experimental stage, still I thought I ought to call attention to this method of lighting as applicable for rolling stock."

The conclusion reached after the discussion of this subject was that: "A certain number of delegates observed that the most useful system of lighting appeared still to be that based on the use of compressed gas of rich quality. Some other delegates thought that oil lamps, and even candles (in peculiar cases), gave satisfactory results. Trials of other systems, notably that of electric lighting should be continued." It was brought out in the discussion that candles were thought to be satisfactory in Russia and a remark to the effect that in that country passengers preferred to lie down and sleep rather than to read created amusement among the delegates. The suggestion of using candles would seem almost equally amusing to travelers in the United States.

GEARED TRIPLEX ELECTRIC PUMP.

The accompanying illustration shows one of the applications of distribution of power by electricity which are now so numerous. This represents a geared triplex electric pump manufactured by Messrs. Henion & Hubbell of Chicago. The pump is of a design which has been for some time in use as a belted machine and is made in five standard sizes varying in capacity from 750 to 2,500 gallons per hour. It is designed to work with a 150 lbs. pressure and has steel crank shafts, cut gearing, outside packed flanges, large valve areas and is in every way a modern piece of machinery. Suction and discharge openings are provided at either end. When required, valves are furnished for thick liquids, also for sulphur waters or acids. A special base plate is provided for the machine and the motor and pump are both attached thereto. A rawhide pinion is provided on the motor shaft and runs as noiselessly as gearing can be made to do. This is a type of pump which is adapted to situations where it will receive a mimimum amount of attention and it can readily be fitted to work automatically on compression tank or gravity supply systems if desired. It can be placed in a room or inaccessible place and may be depended upon to come as near taking care of itself as it is possible for any machine of this class to do.



TRIPLEX ELECTRIC PUMP.

The Excursion of the Western Society of Engineers.

The Western Society of Engineers enjoyed an excursion to Rock Island and Davenport last Saturday, Nov. 7, for the purpose of inspecting the new highway and railroad bridge which is nearing completion at that point. This bridge is one of the heaviest and most modern in the country, and will accommodate a double line of railroad and electric street car tracks, the latter being laid on the roadway which is beneath the railroad tracks. The bridge was designed and is being constructed under the direction of Mr. Ralph Modjeski. The Rock Island Railway and the government divide the expense, the former paying 60 and the latter 40 per cent of the cost,

A special train left Chicago at 8:10 a. m. with the party, and was drawn by engine No. 1101, which is one of the three high speed passenger engines recently designed and

built by Mr. George T. Wilson, superintendent of motive power of the Rock Island road. Rock Island was reached in time for dinner, after which the train was switched into the grounds of the United States government arsenal and the party inspected the water power plant used for driving the machinery, as well as some of the work being carried on in some of the buildings. The train was switched onto the bridge, where it remained while the draw was swung and the bridge inspected generally by the members of the party. The train was next switched to Davenport, where a portion of the party visited the works of the Bettendorf Manufacturing Co., and saw some striking examples of the work which can be performed by modern hydraulic machinery in the bending and stamping of steel plates into parts of the running gear of wagons.

The run from Rock Island to Chicago was made by engine No. 1101 in what is stated to be the fastest time ever made for an equal distance west of Chicago. The schedule of the run is as follows:

Left Rock Island	3:04 p. m
Left Moline	3:09 p. m
Arrived Bureau	4:12 p. m
Left Bureau	4:16 p. m
Arrived Morris	5:14 p. m
Left Morris	5:16 p, m
Arrived Joliet	5:39 p. m
Left Joliet	5:40 p. m
Arrived Blue Island	6:12 p. m
Left Blue Island	6:13 p. m
Arrived Englewood	6:28 p. m
Left Englewood	6:29 p. m
Arrived Van Buren street depot	6:45 p. m

This makes a running time of three hours and thirty minutes, including stops, for a distance of 181 miles. The run from Moline to Blue Island, a distance of 162.9 miles, was made in 183 minutes, including stops, and 176 minutes deducting stops. It is stated that at one time a speed of 77 miles per hour was reached, and numerous miles were run in 50 seconds. The train consisted of four standard coaches.

The Liverpool Overhead Railway.

At the recent meeting of the British Asscciation Mr. S. B. Cotterell read a paper upon the subject of the Liverpool Overhead Railway, of which the following summary is given by Engineering, of London:

As is well known, electric traction is the method of locomotion followed here, the rule being very short trains at very frequent intervals. The carriages are 45 ft. long and 8 ft. 6 in. wide, and are on two bogies. Each carriage has accommodations for 16 first class and 41 second class passengers. The vehicles are self-propelled, being each fitted with an electric motor. The armatures are series wound and built directly upon the axle. The motors are started first in series and are then switched into parallel. The current is carried to collectors of cast iron fixed under the trains by means of a steel bar 4 in. square in section which acts as conductor. It is made up of lengths of 32 ft. each, these being connected by copper fish plates. The running rails are used for return circuit. A train fully loaded weighs 38 tons. This we should gather from the paper, is a train of two carriages. Of this weight the motor equipment is 6 tons 7 cwt. Lighting is by 32 candle power incandescent lights supplied from the main conductor. The generating station is near the center of the line, and consists of four horizontal compound condensing engines with six Lancashire boilers. Each engine develops 400 horse power. Each engine drives an Elwell-Parker dynamo, of the shunt wound, drum type, of 500 amperes and 500 volts. The dynamo is of the double-limb type, with magnetic circuit above and below the armature, the poles being cut through horizontally along the center to allow the top half to be lifted readily. The efficiency of the dynamos and engines is about 85 per cent at full load. The stations are also lit by electricity, and the signals are worked by the same agency. A short description was given by the author of the method of signaling. This is automatic, the train in passing performing the operation. The first part of the railway cost £90,000 ($436,500) per mile.

A northern extension now carries the line to Seaforth, while a southern extension five-eighths of a mile long is in course of construction. This latter part comprises a length of tunnel where the line passes into the hillside at the north-east corner of Herculaneum Dock. There is also a span of about 200 ft. over a part of the Dock Board property. The author gave particulars of this extension, and also of the new generating plant that will be required. This will be placed in the existing generating station, and feeder cables will be used. Two new Corliss engines, each of 400 horse-power, will be supplied by Hick, Hargreaves & Co., of Bolton, having dynamos by Parker & Co. The output of each dynamo is to be 500 volts, 500 amperes, at a speed of 420 revolutions per minute. Details of this new machinery and of the main switchboard were given by the author.

New rolling stock is being built by Brown, Marshall & Co., and as the number of passengers carried is now over 7½ millions a year, it has been found necessary to increase the size of the trains by one carriage, making three in place of two. The new motors are by the Electric Construction Company. An interesting experiment is about to be made in order to get greater ease of traction, to which end it is contemplated that the roller bearings of the Roller Bearing Company will be brought into use. The author says that a gain of 80 per cent, in starting effort over a train fitted with ordinary bearing will be secured.

The railway has now been working over 3½ years, and has proved that working on the zone system is best. It allows an economy of 25 per cent, on the staff. The value per passenger is 1.97d. The maintenance of the line is heavy, as there are over 80 acres of surface to be protected from corrosion. Twenty acres are painted with oxide paint, and the rest with black varnish, at the rate of once in two years. Blowing the paint on by a pneuumatic machine has resulted in reducing the cost from 2.25d. per square yard to 1.24d. per square yard, including all materials. The motors run an average of 40.000 miles before requiring repairs, in which time they earn over 200£., and can be rewound at a cost of 25£.

The engineers for the construction of the line are Sir Douglas Fox and Mr. J. H. Greathead. The author of the paper is resident engineer and general manager.

A short discussion followed the reading of the paper, in which Sir William Forwood was the principal speaker. The point of chief interest brought out was a statement by the author that a man had fallen so as to connect the line and conductor, the current passing through him. He was much burnt, but Mr. Parker had thrown a piece of iron across, thus short-circuiting the current and relieving the man. Sir Douglas Fox referred to the excellent arrangements made for the care of the men employed on the line.

TECHNICAL MEETINGS.

The annual convention of the American Society of Mechanical Engineers will be held at the house of the society 12 West Thirty-first street, New York City, December 1st to 4th, 1896. Secretary, F. R. Hutton.

The Engineers' Club of Cincinnati has a monthly meeting on the third Thursday in each month, at 7:30 p. m. at he Literary Club, 24 West Fourth street, Cincinnati, O. Address P. O. Box 333.

The Engineers' Club of Minneapolis holds its meetings on the first Thursday in each month, at Public Library building, Minneapolis, Minn.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Civil Engineers' Club of Cleveland, meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Association of Engineers of Virginia, holds its informal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the second Friday of January, March, May, September and October, at 2 p. m., at the Hotel Iroquois, Buffalo, N. Y.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Western Society of Engineers holds its regular meetings for the transaction of business and the reading and discussion of papers on the first Wednesday of each month except January.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p.m., at the House of the Society, 127 East Twenty-third street New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each mouth, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Thursday in each month, at 8 p. m., at 12 West hirty-first street, New York City.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumber and Publishing House, Nashville, Tenn.

The Railway Signaling Club holds its meetings in Chicago, Ill., on the second Tuesday of January, March, May, September and November. G. M. Basford, secretary, 818 The Rookery.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Western Foundrymen's Association holds its meetings on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, A. Sorge, Jr., 1533 Marquette building.

PERSONAL.

The resignation of Mr. B. W. Appleton as general freight and passenger agent of the Unadilla Valley road has been announced.

Mr. J. Stanley Orr has accepted the position of traveling passenger agent of the Southern Pacific at Cincinnati to succeed Mr. C. C. Henion.

Mr. Garret A. Hobart, vice president elect of the United States, is about to resign his position on the board of arbitrators of the Joint Traffic Association.

Mr. R. W. Price has resigned his position as traveling agent of the St. Paul & Duluth at Duluth and Mr. Pickering, of Boston, has been appointed to fill the vacancy.

Mr. Charles Paine has been promoted to the position of general manager of the Union Steamboat Line, and the position of assistant general manager has been abolished.

Mr. J. T. Odell, president of the Butler & Pittsburgh road, who has also been acting as vice president of the New York & New England, has resigned from the latter position.

Recently in referring to Mr. C. F. Elliott as general traffic agent of the Florence & Cripple Creek road, the headquarters of the company were said to be at Florence, Colo., whereas it should have read Denver.

Mr. Perry Rogers the well known lost car agent of the Panhandle lines, died very suddenly Wednesday night at Columbus, O. He was one of the oldest, most faithful and highly esteemed employes on the Panhandle lines.

Mr. George F. Sweeley, master mechanic of the shops of the Pennsylvania Company at Crestline, O., has been transferred to the shops of the company at Wellsville, succeeding Mr. Thomas Butler, transferred to the shops in Columbus, O.

Mr. W. P. Jenkins third vice president and superintendent of transportation of the Hammond Packing Company, has resigned his first named title and will give his entire attention to the transportation department, so much have the duties of the department increased.

Mr. C. H. Jenks, superintendent of the Northern division of the Great Northern, having been granted a leave of absence on account of ill health, Mr. C. T. Kittredge, chief train dispatcher, will until further notice have charge of the operation of that division.

Mr. W. M. Craven having resigned as master of transportation of the Georgia Southern & Florida, Mr. W. M. Legg at present yardmaster of the same road at Macon, Ga., has been promoted to fill the vacancy. Mr. Craven goes to the Georgia & Alabama as master or transportation.

Effective Nov. 15, Mr. Robert R. Ritchie formerly Omaha representative of the Chicago & Northwestern will be general agent for the Pacific Coast, with headquarters at San Francisco, and Mr. John A. Kuhn will succeed Mr. Ritchie as general agent, with headquarters at Omaha.

Mr. W. P. Robinson, Jr., general manager of the St. Joseph & Grand Island has been made general manager also of the Kansas City & Omaha and has accepted that road from the hands of the receivers. It is understood there will be no change at present in the force of the company.

Mr. Frank Moorehead, superintendent of the erecting shops of the Vaudalia at Terre Haute, has resigned and goes to the Louisville, Evansville & St. Louis shops in Princeton. He was succeeded on the Vandalia by Mr. Peter Arp, who comes from the Panhandle shops at Dennison, O.

Mr. E. G. Dixon general freight agent of the United Railroads of New Jersey, a division of the Pennsylvania Railroad, has been granted an indefinite leave of absence on account of ill health. Mr. W. H. Brayton, Jr., has been appointed as acting freight agent with headquarters at Philadelphia.

Mr. H. Walter Webb, third vice president of the New York Central road, although still seriously ill of typhoid fever at his home in Scarborough-on-the-Hudson, is thought to be convalescent and safely on the road to recovery. Mr. Webb is one of the most prominent railroad men in this country.

Mr. R. E. Pyle has been reappointed traveling freight agent of the Pittsburgh & Western Railroad in place of Mr. John P. Magill, lately appointed division freight agent of that company at Youngstown, O. Mr. Pyle was for several years connected with the Pittsburgh Junction railroad at Pittsburgh.

On December 1, the reorganization of the auditing department of the Atchison, Topeka & Santa Fe will become effective. The headquarters of this department will then be changed to Topeka, with Mr. John P. Whitehead as general auditor. The position of auditor, held by the late Mr. T. F. H. McKibben, has been abolished.

Mr. W. C. Stith, general freight agent of the Missouri Pacific, will assume the duties of freight traffic manager, vice C. A. Parker, resigned, without change of titles. Mr. Stith has a wide acquaintance among railroad men, all of whom will bear testimony to his ability to discharge his new duties with satisfaction to all concerned.

Mr. J. C. Fears has been made superintendent of elevators at New Orleans, for the Illinois Central road. Mr. Fears goes from St. Louis, where he has been with the

Illinois Central people for some time. The new position is one of considerable importance, as he will have to look after the elevators of the company all over the city.

The Board of Administration under the new western freight agreement is now completed, and is composed of Messrs. J. W. Midgley, C. L. Wellington, C. A. Parker, Henry H. Courtright and H. L. Shute. Mr. Midgley will act as chairman of the new board. Mr. Marvin Hughitt, president of the Chicago & Northwestern Railway, has been made president of the executive board of the association.

Mr. Bryan Snyder, assistant general freight agent of the Gulf Colorado & Santa Fe has accepted the position of general eastern agent of the St. Louis & San Francisco at New York and will take charge of the office on Nov. 20. Mr. Snyders successor will be Mr. W. H. Gleason at present commercial agent of the Santa Fe at San Antonio.

At a meeting of the executive committee of the board of directors of the Missouri, Kansas & Texas Railway Co., held October 30, Mr. Chas. G. Hedge was elected vice president in general charge of financial and accounting departments. Officials and employes heretofore reporting to the controller will now report to the vice president and treasurer, and the office of controller is hereby abolished.

Mr. J. B. Connors has tendered his resignation as superintendent of the Postal Cable & Telegraph Company for the Denver district. Mr. Connors was formerly in the railroad business, having for thirteen years been connected with the Ann Arbor, several of which he held the position of superintendent. His present intention is to return to railroading. He is a brother of Superintendent M. S. Connors of the Columbus, Hocking Valley & Toledo.

Mr. D. H. Hillman has been appointed general Southern agent of the Evansville & Terre Haute and Chicago & Eastern Illinois, to succeed Mr. John Cutler, who resigned to become general agent of the Georgia Southern & Florida. Mr. S. L. Rogers, formerly passenger agent of the Evansville & Terre Haute, goes to Atlanta as traveling freight and passenger agent, and Mr. A. W. Collier, who has been Mr. Cutler's assistant becomes contracting agent at the same places. These changes take effect on the 15th instant.

Mr. C. A. Parker, one of the men recently chosen as a member of the board of administration of the Western Freight Association, began railroad work in 1881 with the Atchison. Topeka & Santa Fe. He remained with this company until 1884, when he was made commercial agent of the Mexican Central, where he remained one year, going back to the Santa Fe in 1885. In 1887 he was made assistant general freight agent of the road and in 1889 he became general freight agent. After six months' service in this position he went to the Missouri Pacific in the same capacity, and in October of 1891 he was made freight traffic manager after having been acting freight traffic manager for some months. This position he now resigns.

Mr. Henry H. Courtright, who leaves the office of general freight agent of the Chicago & Alton road to become a member of the Board of Administration of the new Western Freight Association, stands high among traffic officers in the west and his selection as one of the board will give general satisfaction. He entered the railway service in 1856 and was an agent on the old Galena & Chicago Union Railroad. During his railroad career Mr. Courtright has been general freight agent of the Hannibal & St. Joseph road and the St. Louis, Kansas City & Northern, and also general agent of the Southwestern Railway Association. In 1879 he was made general western freight agent of the Alton and general freight agent in 1881, which position he has held until the present time.

Mr. C. L. Wellington, general traffic manager of the Wisconsin Central Lines, has resigned that position to take his place as a member of the Board of Administration of the new Western Freight Association. Mr. Wellington entered railway service in 1873, since which time he has been consecutively clerk in the office of assistant general freight agent of the Michigan Central at Detroit, clerk for Chicago & Grand Trunk at Chicago, clerk for the Wabash at Toledo, assistant general freight agent of the same road, commissioner of Inter-State Traffic Association at Kansas City, general freight agent Milwaukee, Lake Shore & Western. In 1893 he was made general traffic manager of the Wisconsin Central and has held that position to date.

Hon. H. J. Jewett, formerly president of the Erie Railway, is dangerously ill at his summer home, Lansdown, in Maryland. He is threatened with pneumonia. Mr. Jewett is a veteran railroad man, and was at different times identified with several Ohio roads. He was a director, then vice president and later president of the Central Ohio railroads, and in 1868 he was elected president of the Pittsburgh, Cincinnati & St. Louis Railway and president of the Little Miami Railroad. In 1874 he became the president of the Erie Railway and afterward its receiver, and then the president of the New York, Lake Erie & Western Railroad. He resigned in 1884, owing to the state of his health. He was also director of the Western Union Telegraph Company, the Metropolitan Trust Company and other corporations. Mr. Jewett is eighty-one years of age. His family has been summoned from New York.

Mr. H. L. Shute has been unanimously chosen as a member of the board of administration of the new Western Freight Association. Mr. Shute has a railroad experience covering forty years. His first railroad work was done in the freight department of the Illinois Central at Warren and Galena, Ill. In 1861 he became cashier of the Dunleith Transfer Co., going back to the Illinois Central in 1865, where he remained in various capacities until 1883 among which were the positions of traveling freight agent, assistant general freight agent and general freight agent. From 1883 to 1886 he was general freight agent of the Central Iowa, and then for a short time he held the same position on the Minneapolis & Pacific and Minneapolis, Sault Ste. Marsie & Atlantic. In June, 1888, he became general traffic manager of the Minneapolis, St. Paul & Sault Ste. Marie, and at the recent reorganization of the Great Northern he became traffic manager of that road, which position he now resigns.

On November 7, Mr. J. Waldo, one of the commissioners of the Southwestern Association, died at the Southern hotel in St. Louis, Mo. Mr. Waldo was well known and was prominently identified with the railroads of Texas. He was born at Osceola, Mo., September 11, 1839. In 1866 he went to Houston and immediately, on January 31, entered the service of the Houston & Texas Central road as a clerk in the local freight office in which capacity he served until August, 1868, and from that date to March, 1872, he was station agent at Houston. From March 1872, to January, 1873, he was general freight agent when he became general passenger and ticket agent, serving in that capacity until January, 1881. From the latter date until April, 1883, he was traffic manager, when he was made vice president, serving as such until July, 1885, and from July, 1885, to September, he was general manager. From July, 1885, to May, 1889, he was commissioner of the Texas Traffic Association at Houston. From May, 1889, to July, 1891, he was general traffic manager of the Missouri, Kansas & Texas, and from July, 1891, to June, 1892, he was vice president of the same road and from that date until May, 1893, he was first vice president of the road. In December, 1894, he became president of the Galveston, La Porte & Houston road, and from January, 1896, to his death was also general agent for the receivers of that road. From March 1 of this year he was also a member of the board of administration of the Southwestern Traffic Association. In speaking of his death the Dallas News says: "Of the many able, active, enterprising men Texas has furnished to the railroad world, none stood higher than J. Waldo. He had to an eminent degree, the courage of his convictions and whatever he deemed to be right he maintained firmly and unfalteringly—whatever he had to do, he did conscientiously, energetically and well with a determination of purpose and fidelity to duty."

RAILWAY NEWS.

Atlantic Short Line.—On Nov. 10 Judge Speer of the United States district court for the southern district of Georgia, signed an order for the sale of the Atlantic Short Line on November 17. No price is fixed. This line is projected to run from Macon, Ga., to Savannah, a distance of 180 miles. At present 28 miles are completed from Bruton southeast. In 1895 the company went into the hands of a receiver. No bonds have as yet been issued. The capital stock of the company is $750,000.

Atlantic & North Carolina.—A special meeting of the stockholders of the Atlantic & North Carolina R. has been called for the purpose of leasing that property. It is stated that it is the purpose of the directors to lease the road to a syndicate already formed, and which includes several of the principal stockholders. The road has been operated at a profit, and control would be of advantage to the Southern or the Seaboard; consequently there may be outside competition for the lease. The line is owned principally by the state and extends from Newbern to Morehead City, N. C., a distance of 102 miles.

Chester & Lenoir.—The Chester & Lenoir narrow gage road was sold at Chester, S. C., on November 2, under foreclosure proceedings, and was bid in by Mr. W. A. Clarke of Columbia, S. C., on account of the bond and stockholders. It was bid in at the upset price $70,000 subject to mortgage of $100,000 on that part of the road north of Newton, N. C. The committee of bondholders will at once proceed to carry out the reorganization on the plans already agreed upon. This is said to be one of the few railroads sold and reorganized without "freezing out" any party at interest. The stockholders received 50 per cent stock in the new company in lieu of their holdings in the old company. The road now fills a gap in its line by track rental from the Western North Carolina, but the operation of the road under the receivership has been successful enough to warrant the issue of $500,000 of reorganization 5 per cent bonds and part of the proceeds will be used to complete the line, and other betterments and improvements such as shops, depots, rails, etc. The line is 110 miles in length.

Chicago & Northern Pacific.—The date of sale for the Chicago & Northern Pacific has been fixed for Tuesday next, November 17, and will take place at the Harrison street station in Chicago. The sale will be in charge of Mr. Henry W. Bishop, special master in chancery and will include rolling stock, franchises and property of every kind and description. As now planned the purchase price will be $10,000,000, the purchasers to assume two mortgages which are preferential, one in favor of the city of Chicago for $650,000 covering the station property, particularly, and one in favor of Messrs. Edwin A. Abbott and John A. Stewart for $394,000. It is understood that the Wisconsin Central companies intend to secure the Chicago terminal property as a part of that system.

Cincinnati, Jackson & Mackinaw.—The Central Trust Co. of New York has filed a petition in the United States court at Cincinnati asking for a decree of foreclosure and sale of the Cincinnati, Jackson & Mackinaw R. The circuit court of the northern district of Ohio granted a similar decree and gave the railway company ten days in which to pay the amount due the trust company. Judge Ricks ordered that, the railway company having failed to pay its indebtedness, the property held under mortgage be sold as an entirety at the court house at Van Wert, O., upon a date to be designated. No bid under $1,000,000 will be accepted. Judge William H. Taft, United States circuit judge for the southern district of Ohio ordered that the decree of foreclosure and sale of the circuit court of the northern district of Ohio be ratified, confirmed and adopted, and made also a decree of the court of the southern district.

Crystal River.—Dispatches of November 10 from Aspen, Colo., says the roadbed, right of way and five miles of track of the Crystal River R. Co. were put up at sale by Sheriff Strawbridge under judgment execution, and sold to Orman & Crook, judgment creditors. The road is to tap a rich section in both Pitkin and Garfield counties, and when completed will have a total length of 28 miles.

Detroit, Lansing & Northern.—The Detroit, Lansing & Northern road, together with its entire equipment, was finally sold November 10. The sale was made by Mr. John S. Lawrence master in chancery under mortgage foreclosure and took place at Grand Ledge, Mich. The property was bid in for $48,000, subject to other mortgages, by Messrs. F. A. Nims of Muskegon and John W. Champlin of Grand Rapids, who acted as a committee in the interest of bondholders.

Kentucky Midland.—Rumors from the south state that the Kentucky Midland road which is to be sold at auction the first Monday in January next, may be purchased by an English syndicate. It is said that the representative of English capitalists who has been making an examination into the affairs of the Kentucky Midland during the last month has made a favorable report, recommending the proposed purchase. It is the intention to extend the road from Frankfort to Alton, where connection will be made with the Louisville Southern; and from Paris it is to be extended into Bath county, where it will tap the Chesapeake & Ohio. These will be valuable connections and greatly enhance the value of the present mileage.

Little Rock & Memphis.—The sale of the Little Rock & Memphis road which was to have taken place on the 10th has been posponed until March 17th, 1897. Within the last eighteen months several dates have been set by the United States Court for the sale of the Little Rock & Memphis railroad, and each time the sale has been postponed. It is probable that the sale will be postponed again unless the bondholders should make up their minds to come down from the prices at which they have been holding the road in the past.

Louisville, Evansville & St. Louis.—In the United States court at Springfield, Ill., on November 7, Judge Allen rendered a judgment for $93,975 in favor of Messrs James H. Hopkins and E. O. Wilson, receivers of the Louisville, Evansville & St. Louis Consolidated Railroad Company against the East St. Louis Connecting Railway Company and the Adams Ferry Company of East St. Louis, for rents taxes and under a lease made by the complainant to the defendants.

New York, New Haven & Hartford.—The New Haven company has sent out notices to the few remaining stockholders of the Providence & Stonington Steamboat Co. asking them to surrender their holdings for a certain price which is understood to be about $150 a share. If they refuse to surrender their shares, which are understood to be but a few hundred, legal proceedings will ensue to compel them to do so. It is thought that after the shares are all in possession of the New Haven company the Stonington line will be discontinued. While the Stonington line has been earning dividends they have not been so large as formerly and a considerable economy of boat service will be effected by the discontinuance of the line, which may also result in a partial transfer of its freights and passengers to the railroad. The discontinuance of the line will leave the New Haven Company with a superfluity of boats, but how they will be disposed of is uncertain. The change has been long planned and its delay has been due to the refusal of the remnant of the boat line stockholders to sell their shares, except at an extremely high price.

Norfolk & Western.—According to announcements made about two weeks ago, the Sciota division of the Norfolk & Western R. was sold at Portsmouth, O., on Nov. 11. It was bid in by the reorganization committee of bondholders for $110,000, the mortgage indebtedness of $5,000,000 to be assumed by the purchasers. This division is 131 miles in length.

Northern Pacific.—A meeting of the stockholders of the Northern Pacific was held at Madison, Wis., on the 7th inst. The purpose of the meeting was the final step in the re-organization plan adopted last March authorizing the issue of bonds to the amount of $190,000,000 to take the road out of the receiver's hands. This issue of bonds is secured by mortgages on the company's property and franchises, which consist of $60,000,000 general lien 3 per cent. bonds, and $130,000,000 4 per cent. gold, running 100 years. The proceedings Saturday were formal, ex-Senator Spooner voting the proxies of the stockholders. This was Senator Spooner's last official act as Northern Pacific attorney.

Ohio Southern.—The sale of the Ohio Southern road will probably take place on the 21st inst. It was to have taken place on Saturday 7, but at the request of Judge Doyle of Toledo, who represents the Central Trust Co., the sale was deferred. The Hon. D. J. Ryan of Columbus was on hand to bid on the road, and stated that he would place

$15,000 in special masters' hands necessary to bid, and would not offer less than $200,000 the upset price. There were a number of others ready to bid on the property.

Omaha Bridge & Terminal.—Mr. John R. Webster, assistant general manager of the Omaha Bridge & Terminal Co. has, it is said, stated that the contemplated improvements by that company which were conditionally contracted for some time ago, will now proceed. These improvements will involve approximately the expenditure of $500,000 and will include connections with all roads entering Omaha, South Omaha and Council Bluffs, the building of freight depots, etc. At present the terminal company is handicapped in transferring from one road to another. The largest single improvement will be the construction of a connecting line with the Missouri Pacific. On Novemer 8, however, the trans-Mississippi exposition directory decided to push the project with great energy.

St. Paul & Northern Pacific.—Notice has been given that a special meeting of the stockholders of the St. Paul & Northern Pacific R. (a leased line of the Northern Pacific) would be held November 20 to pass on a proposed sale of all the railway, land grant and other property of the company to the Northern Pacific R. Co., and the terms of such sale, if a sale shall be decided upon. The Central Trust Co., trustee, gives notice that $809,000 of the general first mortgage bonds have been called for redemption at 110 for the sinking fund. Interest on the bonds ceases on Jan. 1, 1897. The amount of bonds ahead of the new prior lien bonds has now been greatly reduced. In addition to over $20,000,000 general first mortgage bonds (out of $41,879,000) turned in for exchange under the plan, $340,000 paid with land sales ceased to draw interest July 1, 1896, and now an additional $809,000 is to be paid off at 110. This is in accordance with the expressed intention of the reorganizers to retire these bonds as fast as possible under the provisions of the deed of trust. All outstanding Pend d'Oreille division bonds ($324,000) have been called for payment, interest ceasing Nov. 25. The St. Paul & Northern Pacific runs from Brainerd to St. Paul and from Little Falls to Staples, a total of 181 miles. The company has a land grant adjacent to the line between Brainerd and Saux Rapids of about 175,000 acres.

NEW ROADS AND PROJECTS.

Canada.—The North West legislature of Canada has adopted a resolution directing the attention of the government to the necessity of immediate arrangements for the construction of a railway through Crow's Nest Pass that the trade of the Kootenay district may not be permanently deflected into American channels. The resolution recites that "the Crow's Nest Pass contains large areas of bituminous and channel coal of a coking quality; that with these valuable coals the erection of smelters and refineries may be expected to follow; that the existence of this railway will, at least, permit these territories to compete with Eastern Washington in the supply of the necessarily large amount of food products required in the mining regions of Southeastern British Columbia." It is understood that Mr. E. A. C. Pew is about to leave for England to complete the organization of a syndicate to build a railway from Lethbridge through the pass to Rossland, and it is also stated that several wealthy men in Ontario are behind him and that he has been in communication with British capitalists, who are prepared to provide the funds necessary to build the 280 miles with which to connect the points named. At Rossland connection will be made with a projected line to the coast. The bill which will be proposed by Mr. Pew's syndicate has been drafted. It requires the company to deposit $500,000 with the governor-in-council to guarantee that the line will be commenced in two years and completed in five. As it is contended by many that the Crow's Nest Pass ought not to be given into the hands of a corporation, it is provided that any railway so desiring shall have running powers over the proposed line at rates to be fixed by the governor-in-council.

Indiana.—A special election has been called to be held in Goshen, Ind., Tuesday, Nov. 17, for the purpose of voting on the proposition for extending aid equal to one-half of 1 per cent on the assessed valuation of the property for the construction of the proposed Goshen & Wabash Railroad. This project has now passed into new hands and is under the control of Messrs. F. G. Hubbell, C. W. Miller, Alfred Lowry and J. A. Beane, all of Elkhart, Ind. The citizens of Goshen have inaugurated a vigorous campaign to carry the proposition through to a successful issue and public meetings will be held in furtherance of the project.

Mexico.—A concession has been granted by Governor Gaudalupe Maniero, of Victoria, for the construction of a railroad from San Miguel, a town opposite Rio Grande City, Tex., to the Gulf Railroad. The federal goverment will give him a subsidy of $5,000 for each kilometer constructed. United States capitalists will furnish the money for the enterprise. This road will make an important link in a direct road from the Texas border to the City of Mexico.

North Dakota.—It is said that in the early spring the Northern Pacific will begin work on a line from East Grand Forks, following the river and crossing it at Drayton, tapping another wheat belt, the only outlet for which now is a line of boats that reload twice into cars by means of elevators. These boats are operated by the Great Northern.

Nova Scotia.—A syndicate has recently been formed for the purpose of constructing a new road which will penetrate the center of Nova Scotia and open up a region of exceptional wealth. The new line is now a surety and has passed the "on paper" stage, actual work having begun. The line will be 100 miles in length and will be known as the Nova Scotia Southern. Its ocean terminus will be at Shelbourne, N. S., where lines of packet steamers will connect with Boston. New York and New Jersey capital is said to behind the enterprise in liberal quantities. The dominion government also favors the project and with liberal grants of land and valuable franchises has furthered the American interests in every possible way. The road, starting from the ocean, cuts through an almost unbroken pine wilderness northeast to New Germantown, and has in addition a spur meeting the ocean again several miles above Shelbourne. It will bring in connection with the commercial world mines, forests and agricultural land which has heretofore been but little more than worthless owing to the lack of transportation facilities. Mr. R. G. Hervey, of New York City, is the promoter of the enterprise. He reports that every dollar for this new line has been subscribed, and further states that it will be but a starter in the province as it is a country of magnificent resources. Mr. Hervey was at one time closely identified with the railroad interests of Illinois. In the early 70's he constructed the Paris & Decatur R., which was afterward the Illinois Midland. He was president and chief stockholder of the line for many years. Afterward he constructed the Birmingham & Sheffield R. in Alabama and the Rockville & Westport line in Canada.

Ohio.—The last steps, according to special telegrams, are being taken by the representatives of the Brice interests, to connect the coal fields around Jackson, O., with northern and western Michigan. On Nov. 9, the chief engineer of the Cincinnati, Jackson & Mackinaw was ordered to survey a line from Hudson, Mich., on the Cincinnati, Jackson & Mackinaw to a point on the Lima Northern, near Adrian, Mich. It is said that as soon as the lines are surveyed work will begin on the new line, and it will be pushed as fast as the weather will permit, and it is expected to be ready for operation in a few months. The Brice lines comprise the Ohio Southern, Lima Northern, and Cincinnati, Jackson & Mackinaw. The movement which was recently inaugurated to get the latter road out of the hands of a receiver together with these later developments, seem to indicate that a consolidation of the three roads is soon to take place, and no doubt other improvements will follow.

South Carolina—It is said that surveyors have been looking over routes between Cheraw and Columbia, S. C., and that as soon as the pending negotiations for the transfer of stock of the Seaboard Air Line are completed, that an extension will be built there to.

South Dakota.—Articles of incorporation have been filed at Pierre, S. D., for the construction of a road to be called the Dakota & Pacific R., to run from Rapid City to Sioux Falls, crossing the river at Chamberlain, with a branch from a point in Pratt county to Pierre, and a branch from Chamberlain to Huron. The charter also permits an extension of the same line westward from Rapid City to a point in Wyoming. The incorporators are William T. Coad, Charles D. Matteson, John B. Henry, of Rapid City; Joseph H. Muhlke and Forest O. Murdock, of Chicago. The capital stock is fixed at $20,000 per mile, or a total of $18,000,000.

Texas.—A contract has been closed between the Jack county railroad committee and the Gulf, Brazos Valley & Pacific R. Co, whereby the former gives a bonus of $25,000 in cash, right of way through Jack county, depot grounds in Jacksboro, and an advance of $1,250 cash for engineering and general expenses. The corps of engineers under Mr. H. M. Berry is now locating the line and as soon as this is determined upon and a map of the same is furnished the Jack county railroad committee, they will at once procure deeds to the right of way and deliver them to the railway company. When this is done the work of grading will commence from the Jack county line to Jacksboro.

INDUSTRIAL NOTES.

Cars and Locomotives.

—The C. R. I. & P. Ry. is said to have closed contracts with the Wells & French Co. and the Michigan Peninsular Co. for two lots of cars of 250 each.

—The Northwestern has closed with the Haskell & Barker Car Co. for a lot of 1,000 box cars.

—The Illinois Central is reported about to contract for 1,000 or more freight cars.

—The Great Northern road is stated to have placed a contract for a lot of 5,000 cars.

—The Michigan-Peninsular Car Works have an order for fifty side dump cars for the Columbus & Hocking Valley Railroad.

—The receiver of the Colorado Midland is preparing specifications for box cars, and will probably place an order for 100.

—The Baldwin Locomotive Works has received an order for five eight-wheel locomotives with 21 x 26 cylinders for the Colorado Midland Railway.

—The Haskell & Barker Car Co., has taken the contract for the 100 cars for the Wisconsin Central referred to last week.

—Some time ago the Pittsburgh Locomotive Works built two six wheel engines for the Ota Railway of Japan and recently they received orders for five more engines of the same pattern. The plans for these engines were furnished by the Japanese engineers, and our local mechanics are free to admit that the "Japs" know just what they want and have given motive power problems a careful study. For a number of months a young Japanese nobleman was employed at the Pittsburgh works learning the trade of an engine builder, and he gave the Pittsburgh works a good recommendation.

—Orders have been given the Pan Handle shops at Columbus to build 75 flat and 12 cabin cars. The Ft. Wayne shops are to build a quantity of gondola cars.

Iron and Steel.

—The Big Four has placed an order for 30,000 tons of new steel rails to be used in renewing the track between Cincinnati and Cleveland. These new rails will be eighty pounds to the yard.

—President John W. Gates, of the Illinois Steel Co. The Rookery, says that in consequence of the victory of sound money the company has started up its Joliet works, which gives employment to 2,800 men, when running full. Mr. Gates said: "I think that within a few weeks, probably early in December, we will start up the South Chicago works. We also have plans under consideration for extending our plant in Milwaukee, but nothing is definitely settled. The iron business has suffered more on account of the Chicago platform than any other line of business, and we look forward to very large business next year. There will be much railway building and renewals; and a large amount of foreign capital will be invested here in new enterprises, which will help the iron and steel trade. While the stocks of pig iron are large there is a vast vacancy to be filled. There are probably 30,000 merchants and users of steel and iron, for whom an average stock would be thirty tons. That would require 900,000 tons at a small estimate to give them a normal stock, and they practically have nothing on hand."

—M. Oshima, technical director of the proposed steel works in Japan, and four Japanese engineers recently arrived in this country on the steamer Rio de Janeiro from Yokohama. They are on a tour of inspection of the great steel works of America and Europe, having in contemplation an order to buy a plant costing, approximately, $2,000,000. They say they will buy where they can get the best and cheapest. The plant when finished is to have a capacity of 100,000 tons. It will be built in the coal fields in Southern Japan. Both Martin and Bessemer steels are to be manufactured. The party will examine the manufactories of San Francisco, and then go to St. Louis, Mo., Chicago, Ill., and Pittsburgh, Pa., and on to Europe.

—The Franklin Steel Casting Co., Franklin, Pa., manufacturers of steel castings of all descriptions to 60,000 pounds, have been adding very largely to their plant in the shape of additional buildings, tools, cranes, furnaces, etc., with a view of taking care of their increased business, and they now have in appointments and capacity one of the largest steel castings plants in the country, with the ability to take care of castings up to 60,000 pounds in weight. They state they have now some of the largest hydraulic riveters, cylinders and electrical generator work on record. This concern also manufacture the Lone Star all steel coupler, of which they are owners and for which they have a large number of orders. W. B. Corinth, who has been identified with the company since its inception, was recently elected general superintendent.

—The Great Northern Railroad has just closed a contract with the Carnegie Steel Co. to ship from Pittsburgh to the Japanese government at Yokohama, Japan, 6,500 tons of steel rails and fastenings, the shipment going via Cleveland, Northern Steamship Co., Great Northern Railroad from Duluth, and their steamship line, the Nippon Yusen Kaisha, from Seattle to Yokohama. This is probably one of the largest shipments that has ever gone via the Pacific coast to Japan, heretofore all large shipments to China and Japan have gone via New York.

—On January 1, 1897, the Keystone Axle Company of Baltimore, Md., with a capital of $200,000, intends to start its works at Beaver Falls, Pa., for the manufacture of car axles by an entirely new process. Instead of the usual method of making car axles by forging, the company will manufacture them by rolling, thereby it is hoped, increasing the tensile strength and producing a metal of great uniformity. The building where the work will be done has already been erected by the Pennsylvania Bridge Company. It is 80x200 ft. in size, of iron framework, and with roof and sides covered with corrugated iron. A battery of six Brownell boilers is being installed, with a capacity of 1200 horse power. A special engine for the plant is now being made at Philadelphia. The axle machines are being made by Robinson, Rae & Co. of Pittsburgh, and are very ingenious appliances, invented by John T. Rowley of Tyrone, Pa. A steel bloom 9 in. square is first taken and reduced by rolls to 5½ in. round iron. This is cut into three parts, each the exact length of an axle. These pieces after being brought to a proper heat, are passed longitudinally through the axle machine at the rate of two per minute and come out shaped axles and correct in size with the exception of the journal and wheel seat which are 1-16 in. larger. The capacity of the plant is estimated at 250 axles per day. John Deegan, formerly manager of the Sterling Boiler Works, is the superintendent of the company. The officers are: D. A. Clark, president; John T. Rowley, vice president; Thos. R. Torrence, secretary and treasurer. General offices are in the Equitable Bldg., Baltimore, Md.

—The Youngstown Iron & Steel Roofing Co. has just completed a large addition to its plant and equipped it with a number of tools of the latest design, by which its capacity for production has been largely increased. In addition to manufacturing all kinds of corrugated steel and iron roofing and siding, this firm has lately placed on the market its patent Buckeye trough floor, applicable for highway bridges and fire proof buildings. A number of leading engineers of the United States have lately visited

Youngstown, where this trough floor has been thoroughly tested on a highway bridge, subject to heavy teaming and street car traffic, and after a critical inspection of it are said to have indorsed it for use in highway bridges and fire proof buildings. Among the contracts recently secured for this trough floor is the flooring for a bridge spanning the Tennessee river at Knoxville, Tenn. The flooring for this bridge will require 11,330 square yards, the bridge being 1,700 ft. long and 60 ft. wide.

Bridges.

—Press reports state that the secretary of war has approved the changes made in the plans of the new bridge which it is proposed to erect across the Monongahela river at Braddock, Pa., and the company is now at liberty to begin the work. The bridge is to be built by the Union Railroad Co. at the foot of Thirteenth street, Braddock, and will be a double structure. The driveway will be above the railway tracks, and the whole bridge is to be built of steel trusswork. The channel spans are 361 ft. long, and the bridge will be 56.66 ft. above low water mark.

—A resolution has been introduced into the Pittsburgh, Pa., councils authorizing the department of public works to have plans prepared for rebuilding the bridges carrying Penn, Shady and Highland avenues over the Pennsylvania Railroad, at an estimated cost of $35,000. The Consolidated Traction Co. will use the bridges and proposes to pay two-thirds of the expense.

—The Keystone Bridge Co. has been awarded the contract for thirteen steel viaducts for the Butler & Pittsburgh. Many of these are for approaches to bridges crossing the principal streams along the new Carnegie line, while a few will be for temporary structures over ravines which will finally filled up. The company is anxious to have the work completed as soon as possible, and the bridge company will employ a large force of men to do the work according to requirements.

—The officials of the Missouri, Kansas & Texas have decided to remove the wooden bridges along the road and place Howe Truss steel bridges in their stead. The number of bridges between Texas Junction and Franklin Junction is 37.

—The Pleasant Valley Traction Co. has had plans made for a viaduct 520 ft. long over Spruce creek, Pittsburgh, Pa. The plan calls for a cantilever span of 201 ft., or an arch 288 ft., with approach spans, roadway 18 ft., walks 8 ft. G. Kaufman, of the Hamilton Building, is the consulting engineer.

—The eastern approach to the bridge of the Kansas City, Memphis & Birmingham Railroad across the Mississippi river at Memphis is being filled with sand. The approach is supported partly by wooden framework, and this is being filled with the material. It is estimated that fully 350,000 cubic yards will be required and that the improvement will cost $100,000. It will not be completed until 1898.

—The Erie Railroad Co. has awarded the contract for a new double track steel girder bridge over the Passaic river between West Arlington and North Newark, N. J., to the New Jersey Steel & Iron Co. of Trenton, N. J. The structure will have a 147 ft. draw and four spans of 95¾ ft. each in length.

—It is reported that the council of Vancouver, B. C., has voted to direct the engineer to prepare plans for a new bridge at Point Ellice. The structure will have three 217 ft. spans, and is estimated to cost about $150,000.

—The county commissioners of Galveston county, Tex., awarded a contract to L. P. Featherstone to build the approaches to the proposed Bolivar ferry at $53,900. The ferry is to be used jointly by the county and the Gulf & Interstate Railway.

—The president of the Ottawa & Gatineau Valley Railway Company has stated that his company will not be able to go on with the work of building the interprovincial bridge over the Ottawa river in the event of the dominion government granting a bonus of only $150,000. Amounts totaling $260,000 have been promised but the statement here referred to means, that unless the government grant is also $250,000 or the other bonuses are increased, he will not proceed with the work.

Buildings.

—It is probable that the Baltimore & Ohio Railroad Co. will reconstruct its Camden station in Baltimore so that passenger trains will not have to back in and out as has to be done at present. It is contemplated to erect new passenger sheds and necessary buildings near the mouth of the tunnel, by which the movements of trains between Washington and New York will be greatly accelerated.

—The Southern Railway Co. is having plans prepared for a big depot to be built at Knoxville, Tenn.

—It is reported the Chicago & Pacific Elevator Co. is preparing plans for rebuilding their two houses recently burned. The combined capacity will be about 1,600,000 bushels. The cost is estimated at $300,000. The construction will require over 6,000,000 feet of lumber and timbers, and will give work to hundreds of men. The machinery in them is also an important factor,

—The plant of the Boston Bridge Co., situated in Cambridgeport, Mass., and covering an area of three acres, was almost entirely wiped out by fire on the night of Nov. 7, with a loss of about $100,000.

—The location of a union station in North St. Louis has been recently discussed by the North St. Louis Improvement Association. It is suggested that one be built at Main and North Market streets for the accommodation of the Burlington, the Missouri, Kansas & Texas, the Wabash and the Merchants' Bridge Terminal railways, and a committee consisting of G. H. Ten Broeck, C. H. Hannebrink and J. K. Cummings was appointed to confer with the interested roads.

—The machine shops of the Waycross Air Line Railroad are to be removed to Waycross from Waltertown before the new year. The site for the shops is just beyond Deen & Co.'s barrel factory on the Waycross Air Line switch at the company's freight and passenger station. The shops will be located on the righthand side of the switch. The main building is to be 55 x 105 ft. The lumber is being cut for the building by the Ware Lumber Co. two miles north of the city. Work will begin on the building about Nov. 15. After the removal of the plant to Waycross the number of employes may be increased. All of the repairing of engines, boilers, and cars will be done at the company's shops, and, besides, all of the cars to be used on the railroad will be built there. The shops and the rolling stock are in charge of Alvin L. Johnson, the master mechanic, who is a son of Capt. L. Johnson, the general manager of the Waycross Air Line.

—Bruce Price, 150 Fifth avenue, New York, N. Y., has prepared plans for the proposed East End passenger station for the Canadian Pacific Railway Co., at Montreal, Que. The structure will be 300 x 66 ft., and is to be completed in about a year.

—The Bureau of Yards and Docks, Washington, D. C., recommends the expenditure of $40,000 for quay walls, $49,000 for shipfitters' shops, $35,000 for dredging, $35,000 for blacksmith shops, $15,000 for first service and $15,000 for repairs to dry-docks at Norfolk, Va.

—The new Mount Royal station, of the Baltimore & Ohio at Baltimore, is almost completed and it is one of the finest passenger stations in the country. Attention has not only been paid to the architectural beauty but the landscape gardener has given his best efforts towards beautifying the surrounding grounds.

—It is stated that the shops of the Ohio River Railroad at Central City, W. Va., will be moved to Kenova in the near future. This will also change the end of the division from Central City to Kenova.

Machinery and Tools.

—The Pancoast Ventilator Co., of Philadelphia, through their selling agents, N. & G. Taylor, recently sold a ventilator 11 ft. diameter, 66 in. weighing 800 lbs., and also one 14 ft. 84 in., diameter, weighing over 1,000 lbs., both to go Minneapolis. There are two of the largest ventilators ever made.

—A contract for twenty-five air compressors and twenty-five air receivers, of medium and small sizes, has been closed by the Clayton Air Compressor Works, Havemeyer building, New York, with one company, delivery of the entire order to be made within six months from date. They also report sales of five air compressors of standard pattern during the first week in November, and the indications point to a decided revival of trade in air compressors, many orders having been held in abeyance, pending the result of the election.

—The Lambert Gas & Gasoline Engine Co., has removed its general offices from Indianapolis to Anderson, Ind., where the works are located. The company reports a fairly satisfactory trade on the Lambert engines, considering the condition of the times. The temporary lull in business has been taken advantage of to perfect some improvements. A new catalog is in course of preparation and will soon be ready for distribution.

—The Frank-Kneeland Machine Co. has just completed and shipped to the Nicopol-Mariopol Mining & Metalurgical Co., Russia, a large lot of plate mill rolls, tables, and charging cranes, to be used in the new steel plant being erected there under the direction of Julian Kennedy. This company has also just completed, what is said to be the largest shear ever built in America for J. H. Sternberg & Son, of Reading, Pa. This ponderous machine weighs 92,000 lbs. and has a capacity to cut 4½ x 4½ cold steel. The engine is 14 x 16, and is as massive in appearance as the shear.

—The Westinghouse Air Brake Co., recently purchased the buildings of the McKehnie Machine Co., at Hamilton, Ontario, and has applied for a Canadian charter for the Westinghouse Manufacturing Co., Limited, of Hamilton. The capital stock of the new company will be $500,000. The incorporators are George Westinghouse, Henry Herman Westinghouse, and John Caldwell, of Pittsburgh, and J. M. Gibson and A. E. Malloch, of Hamilton, the latter being the provisional directors necessary to secure incorporation in Canada. For the present only air brakes will be manufactured, but later on, if the Canadian field offer sufficient encouragement, other mechanical appliances will be turned out. The capacity of the new works will at first be about 1,000 sets of air brakes a week. It is understood that the object of locating there is to avoid paying duty on exports, which is about 35 per cent, or nearly $14 per set of brakes. The company has a large and rapidly increasing trade in Canada. This move was because of a contract entered into with Canadian roads for a sufficient number of brake equipments to warrant the establishment of a Canadian plant. The general manager of the new works will be George F. Evans, of New York; the secretary, Paul Myler, of Pittsburgh, and M. E. Wallace of Wilkinsburg, will be general superintendent.

—The International Boiler Works, East Stroudsburg, Pa., are erecting a new shop, which will be fitted with the most modern machinery for building boilers of all sizes and descriptions. Among the machines that may be named are a steam riveter and 20-foot pair of bending rolls for making large boilers in two sheets. The dimensions of the shop are 100 x 106 ft., and it is expected to be in full operation by April 1.

Miscellaneous.

—A communication and circular has been received from the Dodge Manufacturing Co. of Mishawaka, Indiana, giving a copy of the decision recently rendered by Judge Sage of the United States circuit court of the southern district of Ohio sustaining the Dodge-Philion patent. This case has been in the courts the past five years and the decision closes with the following words: "The evidence is clear that the defendants are infringers. The decree will be against them with costs." Those interested in pulleys and the users of machinery in which the patent referred to is involved will do well to communicate with the Dodge Mfg. Co., as to the bearings of this case.

—One of the severest tests which can be placed upon a new interlocking plant is to have a heavy fall of snow to clog the outside apparatus when the plant goes into service. The National Switch & Signal Co. recently installed a ten lever machine with electric locking applied to the derails at a crossing of the Wisconsin Central and the Chicago, Milwaukee & St. Paul Railways at Hilbert Junction, and a copy of a letter in regard to the operation of the plant has been received which is signed by Mr. F. H. Marsh, the superintendent of the Wisconsin Central Line and is addressed to Mr. H. M. Sperry, signal engineer, for the contractors. The letter is as follows: "Your favor of recent date relative to the Hilbert Junction interlocking received. The plant so far is very satisfactory indeed. We have just had a fall of 12 or 15 in. of heavy snow, but have experienced no trouble whatever in handling the plant. It seems strong and satisfactory in every detail."

—The Chattanooga Coupler & Supply Company at Chattanooga, Tenn., was recently incorporated and organized. This company is composed of George H. Pierce, M. T. Freeman, C. S. Wilkins, Wm. Long, B. D. Haskins and others. They have control of the recently patented Barfield freight car coupler and contemplate manufacturing them on a large scale, providing the rights are not sold. For the past few days a force of men has been manufacturing the couplers at the Southern Malleable Iron Company's plant and have found a good demand. It is an automatic coupler, similar to the Hinson coupler, only it has several advantages not found in the old style drawbar. The local company will establish a warehouse where a general line of railway supplies will be kept.

—The electric power plant at Baltimore of the Baltimore & Ohio Railroad Company is now being used not only to furnish the power for the tunnel motors but to run 180 street cars of the Baltimore Traction Company, to light the Camden station and yards, the Baltimore city tunnel, the Locust Point freight houses, warehouses and yards, Mt. Clare shops and the splendid new Mt. Royal passenger station.

—R. C. Totten, receiver of the Carlin Mfg. Company of Allegheny, has filed his account and tendered his resignation. On behalf of the creditors of the concern, a petition was presented asking that David Carlin be appointed to succeed Totten. They claim the property should not be sold. Totten's report shows profits of $516.46. An order was made appointing Carlin.

—The improvements that are now being made along the line of the Baltimore & Ohio Railroad between Philadelphia and the Ohio river, are but a forerunner of what is to come. With anything like a prosperous year the work that will be done both on the tracks and in the motive power department will over shadow all that has previously been done. It is expected that it will take fully two years to put the line in the condition that the receivers desire it to be.

—Fairbanks, Morse & Co. anticipate a prosperous business. They say they never knew a time when so many orders were held back pending an election or any other one event. The success of McKinley and sound money now releases those orders, and they believe that business will experience quite a revival, and the demand for engines and boilers, machinery equipments, hardware and tools of every kind will be extensive from now on.

—Within the next six weeks the three General Electric motors that have been used for the past year in hauling freight trains through the Baltimore City tunnel of the Baltimore & Ohio Railroad will begin to handle the passenger trains in the same manner. The overhead trolley is being extended three-quarters of a mile north of the Mt. Royal station and about 1,500 ft. at the south end of the tunnel. These motors are giving splendid satisfaction. The maximum load that has been hauled so far consisted of 41 loaded freight cars and two heavy locomotives. By the extension of the trolley line north and south of the tunnel entrances the helping engine will no longer be needed.

—It is reported that the Remington Arms Co., which has large works at Ilion, N. Y., contemplates the removal of the plant to Bridgeport, Conn. Estimates of the cost of a change have been made and will be submitted to the directors. Hartley & Graham bought the plant in 1888 for about $2,500,000 and the Remington Arms Co. was soon after formed. The business men of Ilion will endeavor to prevent the removal.

—The Standard Scale & Supply Co., Limited, of Pittsburgh, has just completed an 80 ton railroad track scale for the state of Ohio, at the new reformatory at Mansfield.

—The Big Four, Chesapeake & Ohio and Baltimore & Ohio Railways have ordered their shops in Cincinnati opened, and enlarged forces at those shops are all running. At Decatur, Ill., 300 men will immediately start work in Wabash shops.